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BBC ACORN USER



BEEB COBOL
first ever compiler for Cobol on the BBC micro



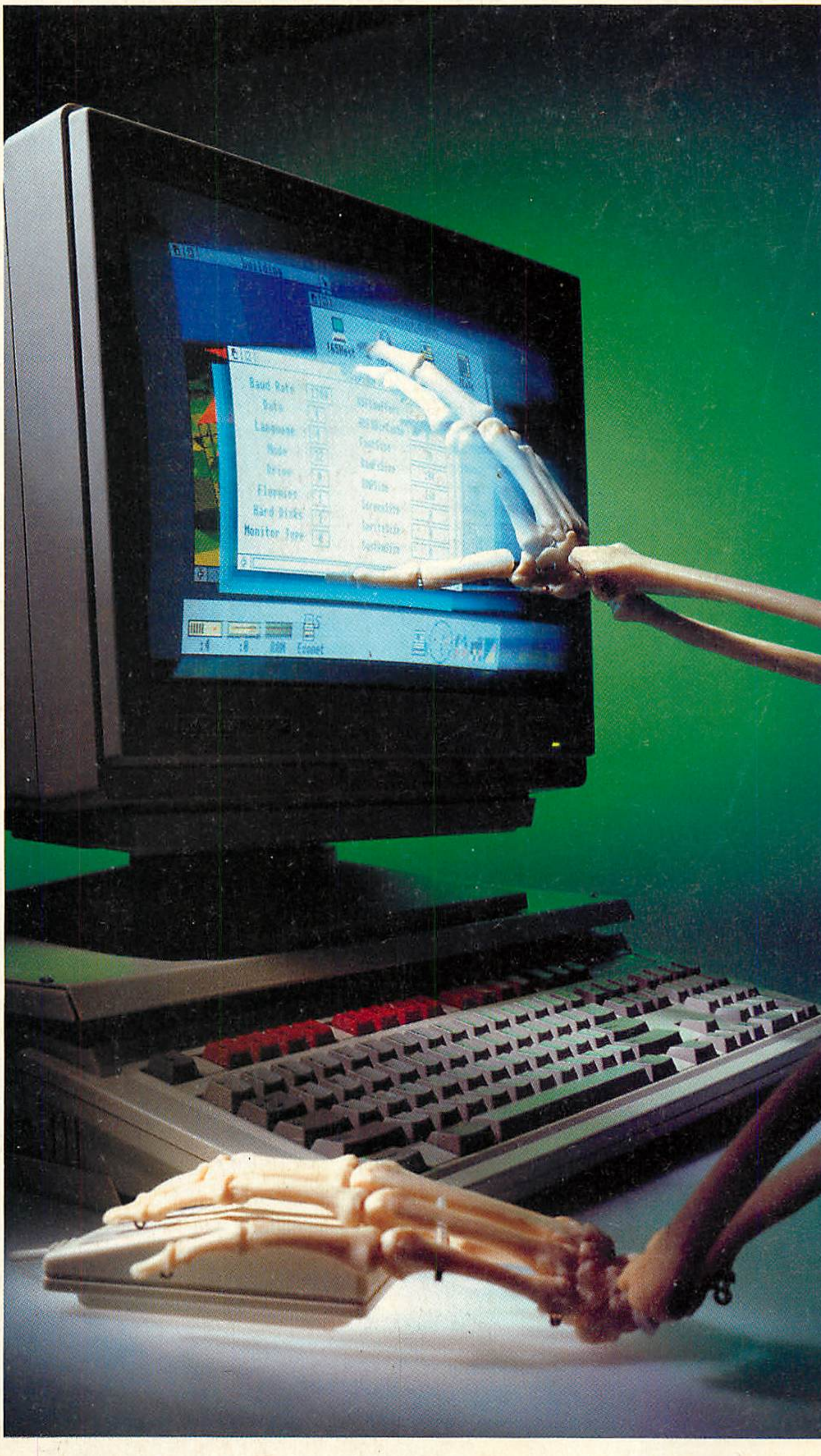
EDUCATION
floor robots in the classroom and Beeb databases



REVIEWS
monitors for the Arc, Multistore, Master OS, Artisan 2, games



READERS SURVEY
share your thoughts and win an Acorn A3000 system



DIY

skeleton for writing your own Risc OS applications

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HOW TO IMPROVE YOUR IMAGE



i-SCAN is the only scanner which has been specifically designed for the Archimedes. Future expansion capabilities for higher resolution and colour are already designed into the system.

i-SCAN consists of a scanning unit, expansion card, leads and software. The scanning unit has a precision motor driven paper transport mechanism which is more accurate than hand held scanners. i-SCAN can handle documents from postage stamp size up to A4 width. A full A4 page can be scanned in less than 20 seconds.

Other Archimedes scanners only produce monochrome images which are processed to produce a grey scale effect. i-SCAN images have 16 true grey levels and a resolution of 200 dots per inch (dpi), this is effectively equivalent to 800 dpi monochrome.

Software supplied with the package is completely Risc OS compatible. The scanned area is selectable to minimise memory used and subsequent editing. A window displays the scanned image where it can be enlarged or reduced. Programmable contrast adjustment caters for difficult images such as pencil drawings.

Images are saved as sprite files which can be used with !DTP, !Paint, !Draw and any other Risc OS application. Industry standard TIFF compressed files will soon be supported.



This image was scanned by i-SCAN



i-SCAN is supplied complete with expansion card, leads and software. All items carry a full one year guarantee.

For a limited period i-SCAN will be available for £579 plus VAT (usual price £679). Desktop publishing software is available at a special offer price when purchased with i-SCAN.

Please telephone Staines (0784) 451192 for more information.

i-SCAN is manufactured by Irlam Instruments Limited, 133 London Road, Staines, Middlesex TW18 4HN.

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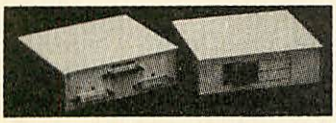
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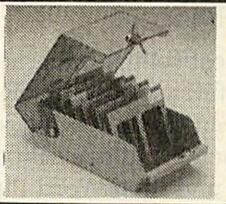
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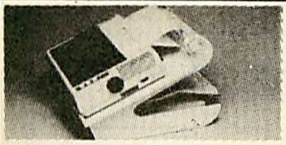
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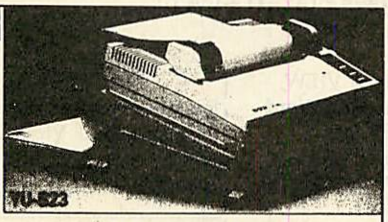
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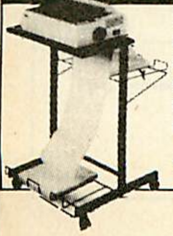


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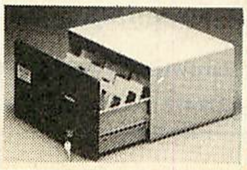
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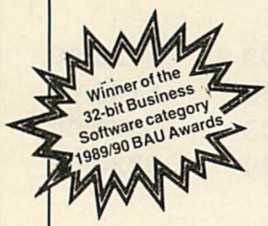
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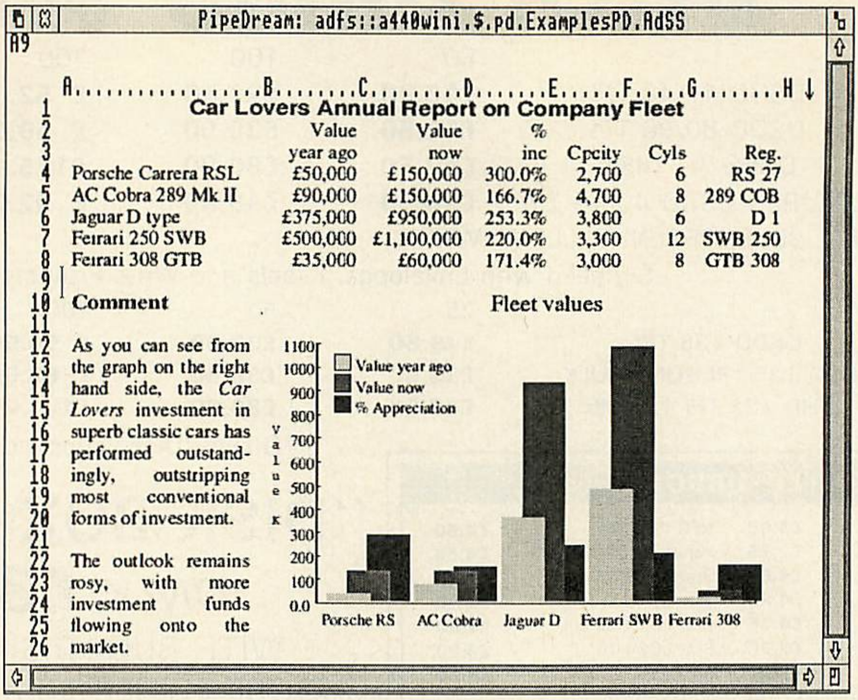
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PipeDream 3 breaks down the barriers between word processor, spreadsheet and database. You can include numerical tables in your letters and reports, add paragraphs to your spreadsheets, and perform calculations within your databases.

Based on PipeDream 2, the best-selling integrated package for the Archimedes, PipeDream 3 has been completely re-written to take full advantage of RISC OS - if you can use RISC OS, you can use PipeDream 3. It is fully multi-tasking and multi-windowing, so you can work on many documents at once and instantly move information between them. And since PipeDream 3 can automatically load and save most popular file formats, including VIEW and First Word Plus, switching to it from other programs has never been easier.

Power, flexibility, speed, ease of use. PipeDream 3. Breaking down the barriers.

For a free brochure, see your Archimedes dealer, or phone us on 0954 211472 or return the coupon.

PipeDream 3 is for all Archimedes computers with RISC OS and 1Mbyte of RAM.

PipeDream 3 costs £147.00 +VAT.

Major features include:

- many documents loaded at once
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- background recalculation
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All trademarks acknowledged. The chart in the screen shown above was produced by sending numbers from PipeDream 3 to Lingenuity's Presenter 2 and then loading the resulting graph back into PipeDream 3.

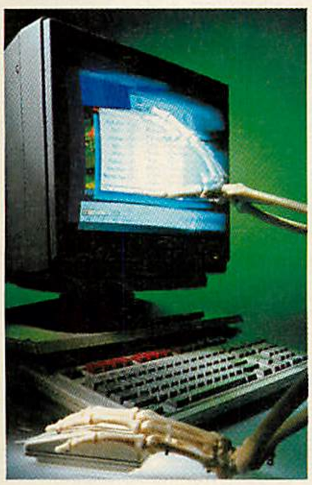
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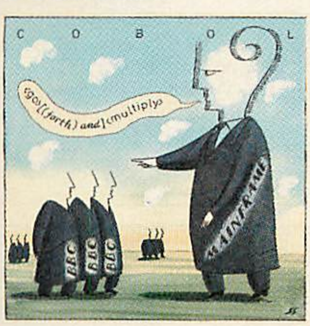
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59 THE BARE BONES

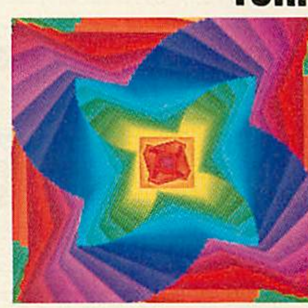


Cover photograph by John Barlow

70 DOWN TO BUSINESS



81 ONE GOOD TURN



78 TAKE TO THE FLOOR



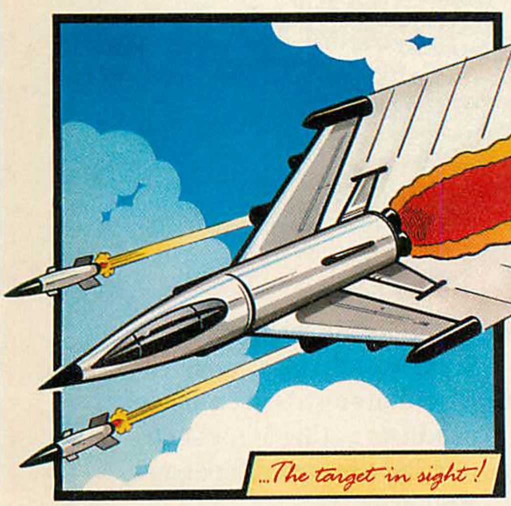
INTER DICTOR

It was getting hot, a couple of SAMS *(Surface to air missiles)* had taken out my escort. I'm on my own.

Going in low was my only chance, got to get under the radar cover. I banked right into the valley basin and started to follow the river, the target could only be minutes away.

BANG!!!

"I HIT THEM AT FULL THROTTLE...



...NOW I'VE GOT TO BLAST MY WAY OUT"

Explosion right in front of me, I yanked the stick hard right, I hadn't expected flak this low. I had to take out the *ack ack guns.* Weaving I flipped off the safety clip and squeezed the trigger.

All I could hear was the deafening roar of *30mm cannon fire,* I watched the tracer burn down to the ground and pop the ack ack like crackers. The bridge was getting closer, over or under? Over and radar would pick me up faster than I could say... Fast, Under and, well, I might not make it.

Some choice, I went under and... I made it, straight into a hail of cannonfire from an enemy patrol fighter, I pulled the stick all the way back, he couldn't match my climb, before he knew it I had dropped on his tail and seconds later two of my *air to air missiles* had ripped him apart... Eat that sucker.

They were throwing everything they had at me now, I was on top of them, I went in on full throttle, they didn't know what hit them.

Five full passes, sure, I got bruised, but nothing compared to the carnage on the ground. Spires of smoke, earthshattering explosions. I had pumped everything I had into them, now I had to blast my way out.

Interdictor is the ultimate in realistic flight simulations. Giving you total control of a high performance modern jet fighter.

It runs on all Archimedes computers with at least 1 MB of memory including the A3000 BBC Micro. At your disposal is a breath taking array of graphics, faithful in almost every detail to a genuine combat mission.

Can you capture all the airfields, can you stop the supply trucks whilst utilising your flying skills in the air. It's up to you with *Interdictor.*

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FIRST WORD UPGRADE

Acorn has announced release 2 of the *First Word Plus* word processor for the Archimedes including the A3000.

The package costs £92 and is available to existing owners for £45.

Release 2 is a Risc OS application operating from within a window, with an extended dictionary of 70,000 words and other minor increases of functionality. Acorn is on (0223) 245200.

PD APPEAL

BBC Acorn User would like to ask our readers to send in any public domain software they may have lying about.

Providing it is either your software, or a title that is in the public domain and free of charge we would be interested in it. The best titles will appear on our monthly discs. Please forward contributions to the editorial address and mark the package PD software.

DABS SPLIT

Computer journalist and publisher Bruce Smith has left DABS Press which he set up with partner David Atherton three years ago.

Smith has left the company to form his own imprint called *Bruce Smith Books* concentrating on sports related titles.

Atherton told *BAU* that Smith's departure was 'perfectly amicable. I bought Bruce out because he wanted to expand into other fields.'

Atherton also told *BAU* that Smith's departure does not affect Dabs Press' plans to publish further Archimedes books and software in 1990. DABS is on (061) 766 8423

ARC LOW COST COLOUR DIGITISER FROM PINEAPPLE

Pineapple Software has launched a low-cost colour video digitiser/frame grabber for the Archimedes.

The devices costs £285 for the standard version and £315 for the extended version with 16 bit storage. The device has a resolution of 512x256 pixels and can accept input from a VCR, TV tuner or camera. External controls provide adjustment for lift, gain and colour saturation to adjust for different input levels. All the hardware is on a single full width podule with provision for an external 12v input for the A3000, and according to Pineapple's Jim Daniels 'the low cost of the device does not reflect in poor quality'.

Grabbed images can be displayed on the Arc in full high resolution colour. Software supplied with the podule enables the user to zoom, store to disc and print images by using star commands and SWI's, thus allowing Basic programs, that can use the Pineapple digitiser, to be written.



Pineapple expects demand for its digitiser to be high and it has set up a waiting list where orders will be met on a first come first served basis. Cheques will not be cashed prior to dispatch. Pineapple is on 01-599 1476.

● *BAU* will feature a review of the digitiser in a forthcoming issue.

DIGITAL ADDS TO ITS ECONET RANGE

Portsmouth based company Digital Services has launched two Econet related software products and an upgraded tape streamer.

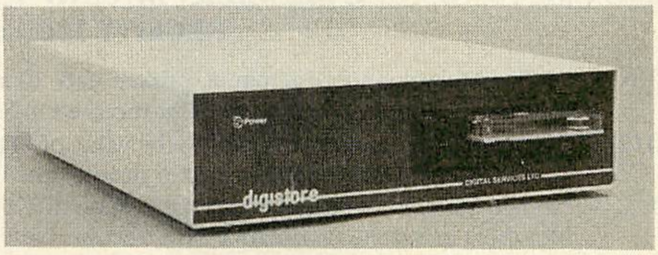
Freeway is designed as a replacement for, and an enhancement to the Acorn printer server Rom.

At £114 it allows any Archimedes to be used as the printer server on a network and automatically buffers data when the printer is busy.

At £40 *Waiter* is an Arc menu-building system for Risc OS which allows newcomers to use programs and files without any knowledge of the directory structure of a disc or network.

Digital Services has also launched a Mk III version of its £1300 tape streamer which is compatible with the BBC micro and the Archimedes. With a claimed data transfer rate of 5.2Mb per minute the unit is available in four formats for Level 3, Filestore E20, Stacking Filestore and Risc OS hard discs.

Digital Services can be contacted on (0705) 210600.



Editor Geoff Bains. **Assistant Editor** Pauline McLernon. **Technical Editor** Robert Miller. **Education Editor** Lisa Hughes. **Editorial Assistant** Christina Neal. **News** David Janda. **Production Assistant** David Noakes. **Art Editors** Adam Hay, Paul Webster. **Ad Manager** Roger Mullins. **Deputy Ad Manager** Ducan Pringle. **Sales Executive** Richard Power. **Ad Production** Liz Walsh. **Production Manager** Jennifer Jeffrey. **Managing Editor** Ellen Brush. **Publisher** Seamus Geoghegan. **Publishing Director** Michael Potter. **Editorial Director** Christopher Ward.

ABC

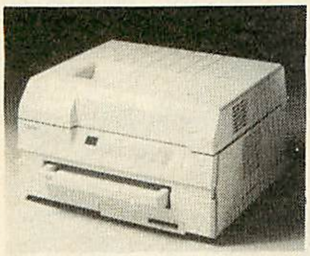
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LOW COST LCS LASER

Qume has released an addition to its CrystalPrint range of liquid crystal shutter laser printers with the CrystalPrint WP Plus.

At £945 the printer is aimed at those who need enhanced facilities but who do not require high-level graphics.

The Plus incorporates a 80186 processor and is capable of printing six pages per minute at 300x300 dots resolution.



The printer incorporates on board HP Laserjet Plus emulation and 256K Ram and is capable of mixing more than one font on a page.

Prestige Elite 12 pitch typeface is supplied as standard with additional fonts available on plug-in cartridges.

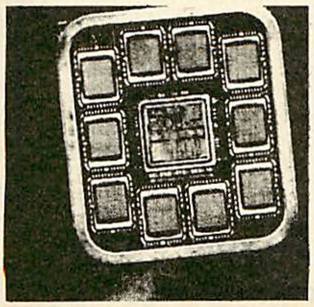
Qume is on (0635) 523200.

SCANNER REDUCED

Irlam Enterprises has reduced the price of its 16 grey-scale motorised scanner from £780 to £666.

The company is also working on an upgrade for the scanner and a software add-on that takes a 200 dpi 16 grey-scale image and turns it into an 800 dpi mono image.

Irlam Enterprises can be contacted on (0784) 451192.



ACORN USED IN MEDICAL DIAGNOSIS

Acorn has won recognition in the medical world for the part played by its Archimedes computer in the development of a revolutionary pulmonery function diagnostic unit (PFDU) – which was a winner of a STI 1989 SMART award.

Commenting on the choice of the Archimedes, Dr John Jackson of Glasgow-based Dedicated Medical Systems Ltd said 'the Archimedes has proven to be the ideal choice owing to its processing power, speed and graphic capabilities which the complex nature of this work requires.'

The PFDU is expected to be of immense value to professionals dealing with both the prevention and cure of many types of lung disease by enabling close monitoring and analysis of the respiratory system of patients, particularly after they have undergone surgery.

In a preventative role the equipment provides assistance in the early diagnosis of serious conditions allowing precautionary measures to be taken so that the development of serious illnesses can be avoided.

Dr Jackson was presented with a trophy and cheque for £12,500 at a special award ceremony held in Glasgow.

The sum will be increased to £37,500 to fund further development.

CHEAP MODEMS

Hi-Tec Modems Ltd has released an approved version of the Hi-Tec EC2400 quad speed MNP level five modem.

The modem is currently available at a special price of £459 (normal £804) and can operate at 300, 1200, 1200/75 and 2400 baud. The Microcom *Network Protocol* software within the modem 'compresses' some types of data being transferred thus giving an effective throughput of up to 4,000 baud.

When used with another MNP compatible modem inbuilt error correction ensures error free transfer of data. The modem also incorporates battery backed Ram for saving modem configurations and a telephone number store.

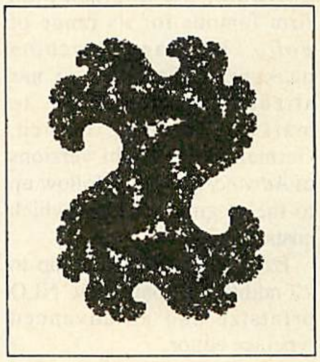
● Hi-Tec Modems is also selling the unapproved HiTec EC2400 Plus for £299. It is functionally similar to the approved model but also features talk/data and reset switches on the front panel.

Hi-Tec Modems is on (0733) 558974.

NUMERIC CHAOS

Cambridge based Longman Logotron which publishes the *Numerator* mathematical construction kit has released a chaos kit.

Used in conjunction with Archimedes *Numerator* the kit is designed to help the user investigate non-linear systems.



The kit consists of a workbook and disc which contains workspaces covering population modelling, damped harmonic motion and mandelbrots.

Logotron is on (0223) 323656.

FREE RAM WITH THE A3000

Watford Electronics' has announced a special offer of 1Mb additional Ram free with every purchase of the BBC A3000.

The offer is available in April only and represents a saving of £159. Watford Electronics can be contacted on (0923) 37774.

ARC RAM UPGRADES

Computerware has launched a range of memory upgrades for the entire Archimedes range of computers.

Memory upgrades are fully plug-in and require no soldering with the exception of A310 upgrades which must be carried out by specialist Computerware dealers.

Prices for the memory upgrades start at £139 for 1Mb for the A3000 and £119 for 1Mb for the 410/1.

Computerware is on (0603) 507799.

GREEN PAPER

More environmentally friendly listing paper is available with the introduction from Weir Paper Products of its recycled listing paper.

The Repeat recycled continuous listing paper is available in 60gm weight in three sizes; 214, 370 and 389mm.

The paper comes in both plain and music rule printed and has a minimum of 75 percent recycled fibre.

Weir can be contacted on (0259) 30341.



NEWS IN BRIEF

● Database Software which publishes *Mini Office* and *Fun School 2* has been set up as an autonomous company.

Previously Database Software has been a subsidiary of the Europress Group. Database Exhibitions has also been set up as a limited company.

● RBRC Software has been forced to make its first ever price increase. As a sweetener, all the company's titles which have increased in price will contain a 10 percent discount voucher on the next purchase of any RBRC software. RBRC is on 01-946 8641.

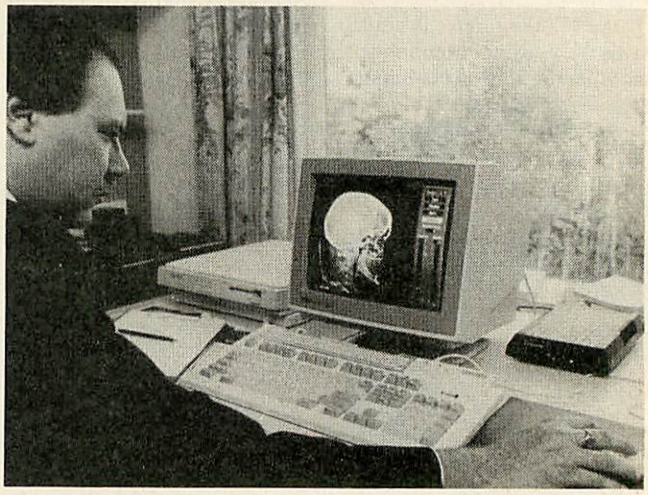
● Ace Computing has released a Risc OS printer driver for the Star LC-10 printer. Costing £15 it also drives all Epson printers with colour ribbons. Ace is on (0223) 462212.

● TV Choice in association with the Price Waterhouse Data Security Division is releasing a video which explains the risks run by organisations which fail to take adequate computer security measures.

Called *Dangerous Transactions*, the video highlights common security problems and shows how to prevent them. TV Choice is on 01-379 0873.

● A couple of mistakes crept into the January and February issues. Clares' *Proartisan* does not cost £180 as was stated in the *BAU* Awards piece last month but has been reduced in price to £99.95. Also, we said in *Questions and Answers* in the January issue that Beebug would supply Richard Russell's freeware Master 512 Basic on receipt of a formatted disc. This offer applies only to Beebug members.

BODY SCANNER IMAGES ON THE ARCHIMEDES



Archimedes computers are being used for remote examination of images produced by Siemens body scanners.

Arcs can now be linked to Siemens CT scanners via standard telephone lines linked to the home or office of a consultant or another hospital anywhere in the UK.

Once transmitted and loaded into the memory of the Arc, a high-definition monochrome image is displayed with electronic contrast and studied in close detail.

According to Keith Philips, CT service manager at Siemens, 'the Archimedes 420/1 is the only machine that offers high-speed image processing capabilities at a cost that will allow the addition of multiple remote stations.'

Specialist company Simis did much of the development work required to optimize the communications facilities and image processing of the Arc.

Siemens currently has a number of systems on trial at selected hospitals in the UK. It is also investigating the possibility of linking Arc computers to other diagnostic equipment such as magnetic resonance imaging machines and Simis is working on a similar system for remote access to sonar data. Simis is on (0483) 233048.

ESM RELEASE ADVANCED FOLIO

Educational Software house ESM has taken over Tedimen Software, the Southampton firm famous for its range of *Folio* language teaching packages. The takeover has already enabled ESM to market English, French, German and Punjabi versions of *Advanced Folio,* a follow up to the original package which costs £28.75

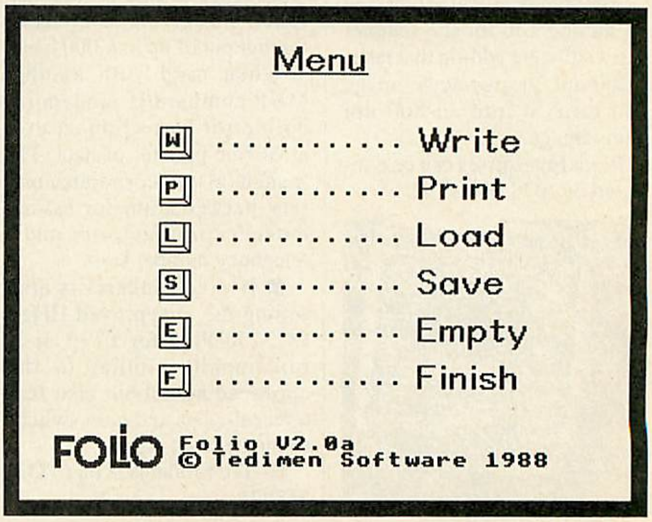
Extra features include up to 20 additional fonts, new NLQ printsize and an advanced typeface editor.

An agreement was also reached whereby former Tedimen employee, Chris Page, will develop further *Folio* packages for EMS.

ESM product development manager, Paul McConkey told *BAU* 'we wanted to take over Tedimen to acquire *Folio* which we consider to be a good, popular product'.

An Archimedes version of *Folio* is to follow later this year. ESM can be contacted on (0223) 65445.

Christina Neal





NEWS IN BRIEF

● A wide variety of Arc software and hardware will be on show at the Archimedes Spring Fair.

This will take place at the London HQ of Cambridge International Software at 8 Herbrand Street, London, WC1N 1HZ on 10 and 11 March. For further details phone 01-833 4023.

● The National Dairy Council's *Healthy Bytes* is intended for nine to 13-year-olds to analyse their personal diet and fitness profiles.

The National Dairy Council is at 5-7 John Princes Street, London, W1M 0AP. *Healthy Bytes* is priced at £12.50.

● On a similar theme, *Making Dough* from the Flour Advisory Bureau simulates the bakery business.

With information sheets students must plan their business before adopting the role of a bakery owner.

Making Dough costs £9.75 from the Flour Advisory Bureau, 21 Arlington Street, London, SW1A 1RN.

● Printer sales specialist Laserink is offering schools the opportunity to become computer dealers.

Scheme members display product posters. Parents and other visitors are encouraged to buy and each resulting sale wins the school a one per cent discount with Laserink. Further details on (0708) 730259.

● *The Role of the IT Co-ordinator* is a compilation of articles written by Nick Evans and originally published in *IT Educational* magazine. It's available from LTS, Haydon House, Alcester Road, Studley, Warks, B80 7AN.

AWARDS LATEST



Children at Rocks Park County Primary School in Uckfield, East Sussex, enjoy themselves on a teddy bear's picnic inspired by a project based on the Sherston Software package, gold winner in the Educational Techonology Awards.

Sherston Software has scooped two of the prizes in this year's Educational Technology Awards recently announced at BETT '90.

Its package for infants, *Teddy Bear's Picnic,* based on the well known children's song, picked up the gold award in the primary category.

The Microbugs, an adventure program aimed at top juniors and set inside a computer, received the bronze award. The silver award went to *Touch Explorer Plus* from the National Council for Educational Technology.

Touch Explorer Plus also took bronze in the secondary category, showing the package's strength across the whole age and ability range.

Winner of the secondary section was Spacetech's Weather Satellite Podule for the Archimedes which the judges found had applications not just in geography but throughout the curriculum.

Silver and second in the secondary was Clares' *Pro-artisan* graphics and image manipulator package.

The Educational Technology Awards were set up to encourage companies producing technological products for the education market.

They are open to any piece of technology – hardware or software – launched in the UK in the last year. Nominations come from schools, not the companies behind the products.

The judges said they were impressed by the quality of the nominations but lamented the fact that there were few new names on the lists.

This year's awards were presented to representatives of the winning companies at BETT 90 at the Barbican, London, by Under Secretary of State for Education Alan Howarth. A full report on BETT will appear in next month's *BBC Acorn User.*

BOOKS BONANZA

Using IT Across the National Curriculum: A Handbook for the Primary Classroom by Sue Senior, claims to be one of the first publications to look at IT in the context of the new National Cùrriculum. Ms Senior published the book privately after being quoted lengthy lead-up times by all of the major book publishers she approached.

As a result of this she has been able to respond quickly to the core curriculum and design and technology attainment targets.

However, by focusing on a number of well known software packages – there are sections on adventure and simulations, information handling and programming, graphics and design – she sets out to demonstrate that current practice in many primary schools is in fact already encompassing a great deal of the new statutory work.

Computers and the Primary Curriculum 3-to-13, edited by Rob Crompton, is another new volume dealing with much the same terrain. It, too, considers the implications of the Education Reform Act and the National Curriculum but the bulk of the book consists of essays on the less controversial areas of practical advice and project work.

Both books are well researched with adequate reference to the classroom. They are also nicely produced and well designed.

However, the revolution in education continues and it may well be worth waiting a while until the pace of change has slowed somewhat before you go investing in texts which deal with the National Curriculum.

Using IT Across the National Curriculum costs £8.95 and is available by post from Owlet Books, Ballochantuy, Tunstall Road, Tunstall, near Sittingbourne, Kent, ME10 1YQ.

Computers and the Primary Curriculum 3-to-13 is published by Falmer Press, Rankie Road, Basingstoke, Hampshire, RG24 OPR, priced £8.50.

Lisa Hughes

WP PLUS adds quality to your word-processing

The latest in the CrystalPrint line, the WP PLUS is built around a simple concept: a low cost printing solution for all word-processing applications. It even allows small areas of graphic – such as logo, line drawings or bar chart – to be included in the text. Like other members of the CrystalPrint family, the WP PLUS is small, quiet and well-behaved. But the family itself is unique. It gives you the flexibility to upgrade through the range as your application needs develop.

Your Business Letter

Your Business Fax
This was printed on a Qume CrystalPrint WP PLUS, formatted in WordPerfect, with the Qume logo scanned in.

Your Product Labelling
The Bar codes have been produced using a Qume softfont and was formatted in WordPerfect V5.0. These bar codes could be printed directly onto labels with the CrystalPrint WP PLUS.

and then be placed on product or packaging. The font used with the bar codes is of an OCR (Optical Character Recognition) type and can be read directly into a computer using an OCR reader.

Your Business Plan
This Demonstration Page was printed on a Qume CrystalPrint WP PLUS Printer. The Graph is taken from Lotus 1-2-3 and has been imported into Ventura Publisher.

Your Business Presentation
This Demonstration of the font capability of the WP PLUS page printer was created using PageMaker and a "Z" font cartridge installed. The Qume logo was scanned in.

Your Technical Document
This was printed on a Qume CrystalPrint WP PLUS and Formatted on Pagemaker Utilising the Qume CrystalPrint "Z" font cartridge. The Qume logo was Scanned and then Imported into Pagemaker.

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Fax: (0635) 521011.



MEGA MODEM FROM HI-TEC

News has reached me of a modem being developed by Hi-Tec Modems Ltd.

So what? Well it's a v.32 modem with v.42bis error correction and data compression. That means the modem will operate at all speeds up to 9600 baud full duplex and incorporate the latest error correction and data compression standards as specified by the CCITT - the international standards organisation.

Currently there are a number of v.32 modems on the market, and some also support v.42bis. On average they cost around £1,000-£1200. Hi-Tec assures me it will sell its beast for around £600. Further, bulletin board operators (Sysops) will be able to purchase the modem at half price on the proviso that they advertise the modem on their board and use it for at least a year.

If Hi-Tec manages to produce its mega-modem and sell it at the ridiculously low price of six hundred notes a few things will happen.

First, the world of high speed computer communications will be opened up to those who previously could never have afforded it.

Secondly, manufacturers of modems that operate at speeds around 1200 and 2400 baud will be forced to lower their prices. Thirdly the manufacturers of v.32 modems costing around £1,000 will be very upset.

Hi-Tec Modems is on (0733) 897333.



Why is this lady smiling? Could it be because she is using the latest Toshiba car Cellphone? Perhaps she's heard widgets are on the up in the market. Or could it be because some copper has just pulled her over for using the phone when driving? Send me her witty excuse and a (small) comms related prize could be yours!

ALL THE SAME

What have the Hi-Tec EC2400, Demon IV and the Pro-4 modems got in common? Easy – they're all the same thing!

Two companies are currently selling the models mentioned above. Modem Marketing Ltd first announced (and sold) the unapproved Hi-Tec EC2400. An agreement was made with Steve White who worked at Modem Marketing and he now sells the unapproved and approved versions of the Hi-Tec EC2400 under the name of Hi-Tec Modems Ltd.

Meanwhile, Modem Marketing sold its unapproved version of the EC2400 as the Demon IV when White parted company. Modem Marketing now sell its approved version of the EC2400 as the Pro-4 modem.

As the modems mentioned above are functionally the same and both outfits could do with the business it would be worth your while to give each company a call and ask them what price they will sell you a modem for. Nuff said!

Hi-Tec Modems is on (0733) 897333 and Modem Marketing is on (0733) 371388.

CAMPUS KIDS

The happy go lucky kids pictured on the right are pupils from Rocks Park School which is in Uckfield, Sussex.

The school has a Campus 2000 subscription which enables them to use areas on Telecom Gold and Prestel. These kids recently pitted their skills at chess against international grandmaster Jonathan Speelman.

Speelman made his moves at Prestel's HQ and the kids made theirs from their school.



Moves were sent and received online using Prestel's mailbox facility and each move was recorded on a dynamic chessboard frame for all to see.

To have a look for yourself key ★CHESS# next time you use Prestel.

David Janda

NEWS IN BRIEF

● Users of PSS, British Telecom's managed data network now have a new service at their disposal called PSS Dialplus.

It provides users with the addition of v.42 error correction and the ability to use the network at speeds up to 2400 baud. For more information call BT's corporate newsroom on 01-356 5366.

● Users of Telecom Gold now have faster, simpler access to the UK's most comprehensive database of business information thanks to a gateway into the ICC computers.

● London based BB *The Gnome at Home* (01--888 8894 - data) now operates at 2400 baud with MNP error correction and data compression to level five. The facility is available to subscribers only.

● Dialcom which operates Prestel has launched two new sports magazines.

First Down is a weekly American Football paper which features news, fixtures and game reports from across the Atlantic.

Rugby News is a monthly magazine which is edited by Chris Rea, presenter of television's *Rugby Special*. It provides an independent view of the sport. Both magazines can be accessed by keying ★SPORTSEYE#.

● Anyone having trouble accessing Hull based BB CCL4 on (0482) 655798 should not access the board with mode 7 terminal software. Use Prestel compatible software.

If you have any comms news please send it to David Janda at BBC Acorn User, *Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ or contact him on Telecom Gold 81: RED001 or via Prestel 919992492.*

COMPUTERWARE

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20Mb for 410/1	£229
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72Mb for 410/1	£999
RAM per 1Mb	£115
ARM3 upgrade	£679

A300 upgrades

20Mb with controller	£435
40Mb with controller	£599
1Mb RAM upgrade*	£399
3Mb RAM upgrade*	£599
MEMC1a upgrade*	£57.50

*(all RAM products are ARM3 compatible. MEMC1a upgrade supplied free if needed.)

Call for special prices on A400 upgrades.

PINEAPPLE SOFTWARE

STOP PRESS – *COMING SOON*

Archimedes full colour video digitizer

- ★ *Resolution 512 × 256*
- ★ *16 bits per pixel storage*
- ★ *full PAL delay line decoder*
- ★ *comprehensive software module with many star commands and SWI's to manipulate image*
- ★ *all for under £300!*

Please write or telephone Pineapple for full details.

HOME ACCOUNTS

This very popular program from Pineapple offers the simplest solution to keeping track of all your home accounts. The program is unbelievably simple to use but still offers all the essential features such as automatic standing order handling, statement reconciliation etc. Any number of accounts may be stored on disc and transfers between accounts requires only a single operation. Available for model 'B', Master and Compact with disc drive.

PRICE £19.95 P&P free

ADFS UTILITIES ROM

ADU is an invaluable utility for all ADFS users. It adds over 22 new * commands to the ADFS filing system as well as providing an extensive menu facility with over 35 sub-commands covering areas such as repeated disc compaction, saving and loading rom images, auto booting of files and many more.

Transferring of files from DFS to ADFS is very simple using the *DFSADFS command. Backing up of discs of different sizes is also allowed, so Winchesters may be backed up easily to a predetermined number of floppies.

PRICE £29.00 P&P free

Please add 15% VAT to all prices

BBC PCB DESIGNER

PCB is a powerful Rom based printed circuit design program suitable for all BBC computers including the Archimedes. It's fast high density 1:1 or 2:1 scale print routine allows prototype boards to be made directly from a printout. The 2:1 print routine provides artwork quality suitable for the most discerning PCB manufacturer. A second Eprom is optionally available to add a powerful auto-track routing facility to the program. This utilises a 'rats-nest' input routine and allows any component to be 'picked-up' and moved around the board without having to respecify track requirements.

The full auto route facilities are available even on an un-expanded model 'B' computer.

'PCB autoroute is remarkable. No similar software comes near the price'
Acorn User — Aug 88

'Although it appears expensive, there is nothing else remotely similar even on other micros for less' — Beebug, April 88.

PCB Manual track routing	**£85.00**	
PCB Auto-routing	**£185.00**	**P&P free**
PCB Plotter driver	**£35.00**	

DIAGRAM II

Still the only BBC drawing package to allow really large diagrams (up to 30 mode 0 screens) to be created. The unique scrolling and indexing system allows easy access to any part of the diagram, and the rapid line drawing routines allow diagrams to be drawn really quickly. The print routines provide unequalled flexibility with infinitely variable H & V scales and 90 deg rotation if required. The smallest scale allows up to 18 mode 0 screens to be printed on an A4 sheet with clearly readable text and full use can be made of wide carriage printers.

'The quality of printing is the last factor which makes Diagram II so outstanding. The package really is capable of producing top quality diagrams' — ETi March 88.

Specially reduced price £25.00 P&P free

MARCONI TRACKERBALLS

We now have an adapter available to link the trackerball to the Archimedes.

Bare trackerball (no software)	£45.00	For model 'B' (inc. IconArt)	£59.00
For Master with Pointer Rom	£59.00	Pointer Rom for Master	£12.50
Adapters to drive Mouse s/ware	£8.00	Archimedes adapter	£19.95
Trackerballs for Archimedes Computers	£49.83		

Trackerballs are also available for other computers — please 'phone
Postage and Packing on trackerballs £1.75

ROLAND PLOTTERS

DXY 880A £545.00 DXY 1100 £625.00 DXY 1200 £865.00
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IBM SOFTWARE and HARDWARE

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PCB Turbo £395.00 LCA-1 logic analyser £450.00
DATACAP RS232 serial data analyser £25.00
Full range of Elonex Computers available please 'phone for prices.

VISA

Please address all enquiries to:- Pineapple Software, Dept. AU, 39 Brownlea Gardens, Seven Kings, Ilford, Essex IG3 9NL

Tel 01-599 1476



QUESTIONS AND ANSWERS

Q I am experiencing difficulty with the creation of 360K MS Dos format discs for a friend's Amstrad PC1640, when using my Archimedes with an external 5.25in disc drive. I can only seem to format 720K MS Dos discs. What do I need to do to get the right format?

A You could use a 'superior' formatting program such as one included in the *PC Tools* package. This will allow you to create the 360K discs without too much effort.

Or you could 'fool' the Archimedes, when running under the PC Emulator, into creating 360K discs. This is done by setting the drive parameters. Unfortunately these have not been covered in the limited documentation included with the emulator and you will need to investigate them in a more detailed book about MS Dos.

Another solution is to get your friend with the Amstrad PC to create 360K discs for you. These can be read and written to with your Arc.

Q The second-hand BBC micro I've just bought is fitted with a Cheetah Sweet Talker. What is it, what can it be used for and how does it work?

A The Cheetah Sweet Talker is a speech synthesizer unit, which was available in 1985. Unlike the official Acorn speech system, it has an unlimited vocabulary as it is based on the allophone system. This means it should be possible to program any word, sentence or phrase.

With the device you will be able to incorporate speech into the games or applications you develop. However you will need the manual to get to grips with the system's programming. Cheetah Marketing, the manufacturer is still in business and can be contacted at Norbury House, Norbury Road, Fairwater, Cardiff CF5 3AS. Tel: (0222) 555525.

Q I am experiencing difficulty in obtaining DTP type software to run on my Master Compact.

A Many of the most powerful BBC-based DTP packages like *AMX Stop Press* will not run under ADFS and so were never released for the Compact. However, if you add a Martec expansion unit and a 5.25in disc drive and load the DFS image found on the Welcome disc, you could use *Stop Press*. One useful DTP package that will work on the Compact in ADFS mode is *Typesetter* published by Sherston Software.

Although aimed more specifically at the educational market, it is an effective text-only package.

Q I have just purchased a BBC A3000 computer and an Integrex 132 inkjet printer. The quality of the text printing is just not good enough for my needs. Is there any reason for this?

A If you are interested in exploiting the wonderful colour graphics of the A3000 then you have purchased the best printer for the job. It is the one that is supported by all the major art and design programs and Acorn supports it too with a Risc OS printer driver. Other colour printer drivers are not supported in the same way.

But, as you have found, the quality of text printing with the Integrex leaves much to be desired. The most sensible use of a colour printer is with art, graphics and design programs.

I recommend you consider the purchase of a monochrome 24-pin printer for use with just text work. The Epson LQ400 or Panasonic KX-P1124 are good, cheap models which would meet your needs.

Q I've just bought a second-hand Master 128. I thought the machine had four 16K banks of sideways Ram but I seem to have two missing! Why is this?

A The reason for the 'disappearance' of two of your banks of sideways Ram is due to the previous owner altering the links that control the use of the Master 128's Rom sockets and sideways

If you have a problem with an Acorn micro, commercial software or a program you are trying to write then *BBC Acorn User* can help. The Post A Problem service guarantees to give you a personal answer within 10 working days for just £4.

Write out your problem with as much detail as possible and, if a program is involved, include a disc or cassette. Fill in the coupon at the bottom of this page and send it and your problem along with a cheque or postal order for £4 (including VAT) made out to Redwood Publishing. If you want recorded delivery add on the cost of this.

Please note that debugging readers' own programs or those from other magazines is a complex task and we cannot guarantee to give a full solution. Unless the problem can be spotted quickly, the Post A Problem service will only be able to make general comments. The service will answer the problem and return all material received within 10 working days of receipt. If we fail to match this promise then your cheque or postal order will be returned – you can't lose!

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OFFICE USE ONLY Date in:

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Ram. When supplied, Rom numbers 4, 5, 6 and 7 are mapped to the four banks of sideways Ram. However, it is possible to switch out the Ram and replace it with the two Rom sockets, which incidently can house 32K Roms.

This is done by changing link 19 to East for socket A and Link 18 to East for socket C.

All you have to do is to alter the links for the missing Ram to reappear.

Q We use the *Edword* wordprocessor at school and I brought home a spare chip to plug into my Master 128 but it does not function properly at all. Is there any reason? Do I need a special Master version?

A In the lifetime of the *Edword* wordprocessor, it has gone through a number of releases. The current Rom is known as *Edword 2* but there are different versions. Not all of the *Edwords* will function properly on the Master 128. This could be the trouble with the Rom you borrowed.

There is now a special sideways Ram version for the Master 128 based on an Australian conversion for the Master Compact. I recommend you obtain a copy of this and use it with your Master 128 at home. You will be supplied with a file conversion program so that you can continue to use the older *Edword* at school with the files you create at home.

Q I want to computerise the school reports that go out to parents each term. At school we have both BBC micros and Archimedes available for this work. What software could help?

A We recommend you consider *Assessment and Profiling Software* by Mick Ellis, published by Ashford Press Publishing and *MPSS* published by Management Data Systems at 108 Parthenon Drive, Liverpool L11 7AQ.

Q Can you recommend some wordprocessing packages for use with a BBC micro?

A There are three really popular wordprocessing packages for the BBC micro. All of them are available as sideways Roms and cost around the same price – between £50 and £60. These are *Wordwise Plus* and *Interword* from Computer Concepts and *View* from Acorn.

Interword and *View* are largely Wysiwyg (what you see is what you get) so what is displayed on the screen is similar to what is printed on the paper.

Wordwise Plus is not Wysiwyg. It uses mode 7 (very good if you don't have a monitor and use a TV) but it does have an excellent preview mode. It is the simplest to use. It has appropriate defaults and is very much 'type and go'.

Interword is the most powerful wordprocessor for the BBC and is outstanding. It has drop down windows for controlling everything and it even shows bold, underline and italic text on screen. It can be quite difficult to get to grips with.

View is popular but again it takes some getting used to. It is, however, well supported with books and other programs.

Q I'm trying to track down a Filofax printing program to use with my BBC micro. Can you help me locate anything?

A Apart from the *Faxform* program in July 1989 isue of *BAU,* the only published package available is from Mewsoft, 11 Cressey Road, London NW3 2NB.

*Fax*Filê* costs around £15. This offers diary printing and address book utilities. There is also an extension disc costing £9.95 which includes a database, label printer, calendar and form printer.

ACORN CUSTOMER HOTLINE

● The Master 128 has *View* (a wordprocessor) and *Viewsheet* (a spreadsheet) built into the operating system. Although the Welcome guide covers these two areas briefly, separate manuals for both products are available from Acorn. The manuals cost £10 each and can be obtained from any Acorn dealer.

● We still receive a lot of enquiries from people who suddenly find their Master 128 or Archimedes is behaving in a strange way. We find that in the majority of these cases the batteries which keep the Cmos Ram powered while the computer is off are completely flat.

Please remember the batteries should be changed every 12 months to be totally safe. The cost of the replacement battery unit for the Master 128 is £4.60 from any Acorn dealer.

The fitting of the replacement battery unit is extremely easy and can be performed by experienced users. The Acorn product code for this item is ADT16 and Acorn does not recommend the use of any other replacement battery unit.

The Archimedes range of machines requires two leakproof AA replacement batteries. The A3000 is fitted with a rechargeable battery and therefore does not need replacing.

● We've been told that the Notify facilities provided by the Econet network filing system under Risc OS can cause headaches for teachers.

The ability to send messages from one machine to another is a useful facility for a Network Manager but when this is extended to network users it soon becomes apparent that this can be abused. However, it is possible to protect the machines against receiving the notify messages. To turn the protection on, use the following call:

```
SYS &4ØØØE,&1Ø,%1ØØØ11111
```

and to turn it off use:

```
SYS &4ØØØE,Ø,%1ØØØØ1111
```

Attempting to send a message to a protected station will produce the error message 'Station ### not listening'.

● If you need to make a technical enquiry regarding one of Acorn's products and your local dealer is unable to help, please write giving full details of your system and the problem you have experienced. This will enable us to deal with the enquiries effectively.

● A number of people have experienced problems when fitting the Acorn 1772 disc upgrade to a BBC model B. The problems are caused by the step times of the 1772 chip which are faster than the 1770 chip.

There are links on the keyboard of the BBC to allow you change the step time. The link settings are as follows:

Link3	Link4	Step time 1772	Step time 177Ø
Ø	Ø	6ms	6ms
1	Ø	12ms	12ms
Ø	1	2ms	2Øms
1	1	3ms	3Øms

Note that a bit is set to zero by inserting a link. A model B without any links inserted is therefore set to use the fastest step times with the 1772 whereas with the 1770 it is the slowest.

Setting link 3 and not link 4 will give you the slowest step time possible with the 1772. You should avoid setting the step time of a standard 5.25in disc drive to 2ms or 3ms with the 1772 chip as most drives will not work at these speeds.

● If there are any specific topics that you would like to see covered by this column, please write to me: *Peter Dunn, Acorn Computers Ltd, Customer Services, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN.*



DEMONSTRABLY BAD

I am a very proud owner of an Archimedes 310 computer, and have been for over two years but feel compelled to put pen to paper (or finger to keyboard) and tell about two recent instances which have made me think about the future of this wonderful Acorn machine.

I was very happy to hear high street electronics shop, Dixons, was to give the A3000 a 'trial run' in some of its outlets around London. If this trial was proved to be profitable, then more Dixons shops would stock the machine.

This sounded like great news for the future of the A3000 and also seemed as if Acorn had made a good decision about which market to pitch its new machine.

However, when working in London I decided to visit the nearest Dixons to have a look at the new machine and to compare it to my trusty 310.

Walking to the back of the store, I could see the computer monitors flickering away with some pretty demos. My heart began to beat faster as I caught sight of the cream coloured case and the red function keys.

'What demo would they have running?'I asked myself. 'Acorn's real time molecules? Ray traced pictures? No such luck! Not even a monitor attached! Not even plugged in!

That should really impress the computer buying public.

All other machines (including Spectrum!) had colourful screens whizzing and blitting around while playing catchy little ditties from the latest top selling games.

I was, to say the least, not impressed by the A3000 sales approach. People seeing the A3000 for the first time, are captured by whatever they see it doing, not by the colour of the keyboard.

My second gripe is about the shop from which I bought my Archimedes. The shop shall remain nameless (although the guys at Electroniquip in Fareham near Southampton will know who I'm talking about) but I regularly make the 50 miles round trip to gaze at the new releases for my machine. Now that's what I call dedication.

On this particular occasion, I was inspired by the good review in *BAU* to buy *Interdictor* from Clares and I went along for a demo before making the final decision.

Arriving at the shop, I found



the A3000 had been moved downstairs along with the other home micros (Arcs had previously lived upstairs with the big business machines).

Although plugged in with a monitor this time, it was running a not-so-impressive colour-cycling mandelbrot program written in Basic.

Stood next to me, some people transfixed by an Amiga (Blah!) running a game called *Shadow of the Beast*. A disc had been left in the Arc drive so I rebooted the machine to see if there were any real goodies I could run to catch the attention of the people beside me. The best thing on the disc was *Balls64,* a demo supplied with Ansi C. I ran this and stood aside to watch the reactions. 'Not impressed' was the verdict.

Giving up, I decided to ask for a go on *Interdictor.* A helpful looking assistant informed me 'the demo would take at least an hour to load as we have problems with it' and refused my offer to load it myself. I asked to see the 'real thing' but he refused to even open the packaging!

Needless to say, I did not buy a copy of *Interdictor* although it's probably a great game.

I don't think I'll be visiting the shop again.

It's sad to think the A3000's future is largely in the hands of people like these. This type of selling technique is not going to sell computers or software and it's the current owners of the machines who will suffer.

M Douglas
Itchen, Southampton

Needless to say, the *Interdictor* demo actually takes only a few seconds to load. Clares is most concerned to hear about your problems with the *Interdictor* demo. In such circumstances, Clares would normally be happy to send you a demo disc direct but unfortunately the *Interdictor* demo requires the full *Interdictor* program to run.

If any dealer in the Itchen area does stock *Interdictor* and can give a demo of *Interdictor,* we would be most pleased to hear from them and pass on the details to Mr Douglas.

HELP!

I am the owner of a Solidisk 2/4 meg 32K board which was one of the last BBC products produced by it before it pulled out of the BBC market. The software on the board is very poor and bug ridden and so I have taken on the task of correcting it myself, most of which I have already done.

I would like to appeal to any owners of this board to contact me with any help they can offer and any suggestions as to other improvements which they think would be worth making to the software and so that I can pass it on to them when it is finished.

I would be grateful if you could help by printing this letter since what I am doing will hopefully help other owners of this board.

Richard York
Narborough

Mr York can be contacted at: Upperlands, Milton Street, Narborough, Leicester, LE9 5EZ Tel. (0533) 867926.

PDQ

PC and Amiga owners currently have access to a huge amount of cheap and very high quality Public Domain software, but this is not so for Archimedes owners. Why? Because it costs too much to advertise it.

The only way for PD authors to inform others of their latest offerings is to place an advert in a magazine or bulletin board, both of which require an astronomically large sum of money. I certainly wouldn't pay £30 for a quarter page advert for free software!

If *BAU* allowed authors to advertise their software at nominal rates, I am sure more PD software would be released. Once the amount of software increases, the magazine could act as a PD distributor.



Please consider the above points carefully. It is only with support from established companies such as yours that PD software will be viable.

A Walrus
Basingstoke

To our knowledge, there is a considerable (and growing) number of PD packages available for the Archimedes. Amongst these is the *Quick Ray Tracer* that generated the pictures seen in January's *Explode* article.

As regards adverts, you'd be lucky to find a quarter page for much less than £200. There is of course our *Software Showcase* page which contains smaller adverts at reduced rates.

Any good PD software would certainly merit a mention in the News pages. If any writers out there think their work is good enough to meet the mark, please send it in.

APPOINTMENTS

Acorn Computers Ltd. is already established worldwide with its high performance quality computer systems and is the only company in Europe to have developed its own RISC processor. We are constantly striving to improve existing products and have an impressive development programme for new products and new markets. As an Acorn user you may have the skills we need to ensure that our programme stays on course.

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Ref AU/AC/017

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Ref AU/AC/003

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We are seeking an Editor for SID, our Support Information Database, used by Acorn customers and dealers. Reporting to the Support Information Services Manager you will be responsible for the day-to-day control of the SID facility, vetting text submitted for insertion on SID, updating the database and processing and controlling requests for registration. You will also be responsible for dealing with customer accounts, answering customer mail and acquiring new data and information to be added to SID. Previous experience of BBC Micros, Archimedes, RISC OS and Viewdata would be useful although full training can be given.

Ref AU/JG/018

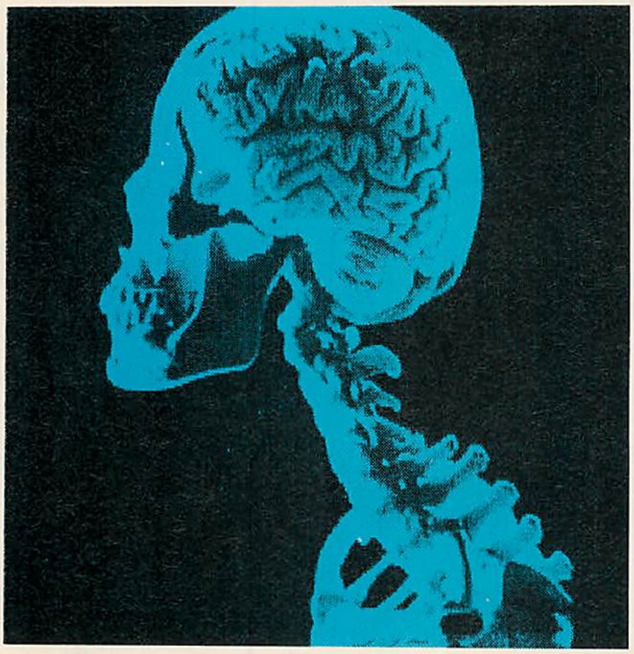
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NEXT MONTH Coming soon to BAU . . .

IT'S ALL IN THE MIND



The April issue of *BBC Acorn User* is a concentration of the mind. Artifical Intelligence – What is it? Is it really possible? Can it be done on the Beeb and Arc?

The answer to the last is of course 'yes' and next month's *BAU* has a wealth of programs to make your computer think for itself (well, nearly). With exercises in parsing, seach and a program which 'learns'.

Next month also sees the second part of the Small Cobol compiler - it's the run time interpreter program along with an explanation of how the compiler works.

There's a treat for Electron owners in the next issue too. We take a long lingering look at all those extras and bolt-on bits that bring a humble Electron up to the same Beeb and Master standard the rest of us enjoy.

Plus, the latest in a long line of successes, Colton's *Pipedream 3* gets the going over as does the Risc OS version of Ace Computing's 3D modelling package, *Euclid.*

And for the many video buffs out there, we take a first look at Pineapple Software's remarkably priced full colour digitiser for the Archimedes and A3000.

Of course, the April issue is also packed to the gills with all the regulars you've come to love. There's *Eight Bits, Risc Revue,* Comms, Education and Music columns, *End User,* News and so much more packed into the fun-filled, action-packed and above all, super-intelligent April *BBC Acorn User.*

MISS IT AT YOUR PERIL APRIL BBC ACORN USER OUT 8TH MARCH

Advice for BBC micro and Master owners from **DAVID ATHERTON** **HINTS & TIPS**

EIGHT BITS

VIEW SORT

The first program this month is a contribution from my good self. It's a sort routine which works from within the *View* wordprocessor.

It can be used to sort lists, tables, or any other data while you are wordprocessing and without leaving the program. In fact, as it stands, it can only work this way although, with some modification, it could be made to work with other wordprocessors or saved text files.

To use the program, type in or load the listing from yellow pages, and run it. This will generate a machine code program called VSORT and if you press a key, this will be saved to disc. Keep this program on the disc which contains your *View* files, and when you are working on a document and you want to perform a sort, press ESCAPE to return to command mode and type *VSORT.

The entire *View* document will be sorted. If you only want to sort part of a document, mark the section you want to sort with marker 1 at the top and marker 2 at the bottom.

You must use these markers and in this way. If you put marker 2 above marker 1 no sort will take place. If you don't have markers 1 and 2 the whole document will be sorted.

The sort occurs on complete lines and starts from the left hand margin. So if any lines are blank, they will be moved to the head of the list. If lines contain embedded commands they will be moved to the bottom of the list, as will rulers.

You should place marker 1 on the first character of the first line you want to sort and marker 2 on the last character of the last line. If you place marker 2 on a blank line below the last line, this will be counted and included in the sort. Being a blank line, it will reappear at the top of the list.



Sorting lists and tables made easy with View Sort

Uses for the program include sorting address lists, numeric tables and other database-type information, either for printing from *View*, or for re-export into another package. For example, the address label utility mentioned in *Hints and Tips* last year could be kept up to date using this sort.

The program works by first determining the area of memory to be sorted. The markers are stored as memory addresses in locations &53 to &5E, where &53 and &54 contain the address of marker 1, &55 and &56 contain the address of marker 2 and so on. If a marker isn't set, the relevant pair of bytes will be set to zero.

The program tests whether locations &54 and &56 are set to zero and if both are not, markers 1 and 2 must be set. Marker 1's address is stored in the word 'start' and marker 2's address is stored in 'end'. Otherwise 'start' is loaded with the value of OSHWM+&100, and 'end' is loaded with the word stored at &000D and &000E which is the *View* 'end of text' marker.

The next stage is to sort the memory area using the carriage return character as a delimiter. Two variables 'ptrA' and 'ptrB' are pointers to strings which are being compared. The sort used is a bubble sort so at any given time, ptrB points to the string subsequent to ptrA. The algorithm of a bubble sort is:

```
REPEAT
flag=FALSE
string(n)=beginning of text
REPEAT
IF string(n) > string(n+1)
THEN SWAP string(n),string(n+1)
:flag=TRUE
UNTIL address of string(n+1)
> end
UNTIL flag=FALSE
```

Each string is tested against the one which follows it and if the second should be before the first, they are swapped and a flag is set. The process is repeated on the entire list until a whole pass with no swaps takes place. The ptrA pointer is set to the start of the text. A special routine 'mcfindnext' then calculates ptrB by sliding along looking for a carriage return, then adding one for the start of the next string. They are then compared and, if necessary, a swap is performed. For this a 256-byte buffer at &A00 is used – no string in *View* can be longer than 132 bytes.

The first string is buffered, the second string is copied to the first string's position and then the first is written back after it. The pointer to the start of the second string is recalculated so it is written back correctly. The comparing and swapping continues until the end of the text is reached. Then the flag is tested and if it is true, the whole process starts again from the beginning of the text. Only if an entire pass is made through the file without any swaps being required will the flag be clear.

If this is the case, the file must be fully sorted and so the routine exits. The time taken to complete the sort is proportional to the square of the file size. A 10K file will take four times as long on average as a 5K file, and for files of 15K and above, the time taken is quite considerable. So, a visual indicator of progress is given in the form of one dot for each pass of the entire text.

The bubble sort was used not because of speed (indeed, it is the slowest of sort algorithms

and made even slower by the fact that searching always commences at the start of the data when it could commence at the last item swapped). However, these compromises were made to fit the code into 256 bytes.

If you want to modify the code for another wordprocessor or to work with a file, this is quite easy. The *View* pointers are set up in the routine 'viewsort' and the main routine 'sort' will work with any contiguous block of text, provided the start and end points are stored in the zero page locations 'start' and 'end', and the item delimiter is set by the Basic variable 'delim'. The sort as it stands is an ascending sort – if you want a descending sort, change the BCC instruction after the label 'different' to BCS instruction.

Note that I have used locations &90 onwards as zero page workspace – this is the Econet workspace and should be changed for Econet machines. I tried initially to use location &70 onwards which, as you probably know, are free to Basic but they are not, it seems, free when in *View*.

£10 ENHANCED INPUT ROUTINE

Paul Walker from Hyde finds that the editing facilities available from the BBC Basic INPUT command are rather crude to say the least, in that if you make a mistake while entering text, the whole of the input to the right of the error needs to be deleted. Once the error has been corrected the remainder of the input then has to be re-entered.



Errors are easier to cope with

Paul's Basic utility aims to overcome this inadequacy and in addition includes several other facilities to aid the Basic programmer.

The program is written as functions in Basic and should be tagged onto the end of whatever program requires its use. Once the functions have been appended to the program all of the Basic INPUT commands may then be replaced by a function call.

The utility is used as follows:

```
<variable>=FNslot(st$,xco,yco
,len,typ)
```

Where st$ is the existing string or numeric variable to be edited or "" if a new string is required and STR$("") if a new variable is required. xco is the screen X co-ordinate of the start of the INPUT line, yco is the screen Y co-ordinate of the string, len is the maximum allowable string length and typ is the type of input required (TRUE – string, FALSE – numeric)

The left and right cursor keys move to the left and to the right respectively and the DELETE

key always deletes the character to the left of the cursor, while the COPY key deletes the character at the cursor and accordingly closes up the rest of the characters/figures to the right.

The above function replaces the Basic equivalent of:

```
INPUT TAB(xco,yco) <variable>
```

For example, to edit the string A$ at tab co-ordinates 10,15 with a maximum length of 12 characters you would enter:

```
A$=FNslot(A$,1 ,15,12,TRUE)
```

If the variable has not been declared previously you would substitute the A$ contained within the brackets with double quotes – a null string.

To edit the variable A at tab co-ordinates 25,4 with a maximum length of five figures you would enter:

```
A=FNslot(STR$(A),25,4,5,FALSE)
```

Again if the variable has not been declared previously you would substitute the A within the brackets with double quotes.

To use the routine to substitute an INPUT command without cursor positioning, use POS and VPOS as the second and third arguments of the function:

```
INPUT X$
```

would become:

```
X$=FNslot("",POS,VPOS,2 ,TRUE)
```

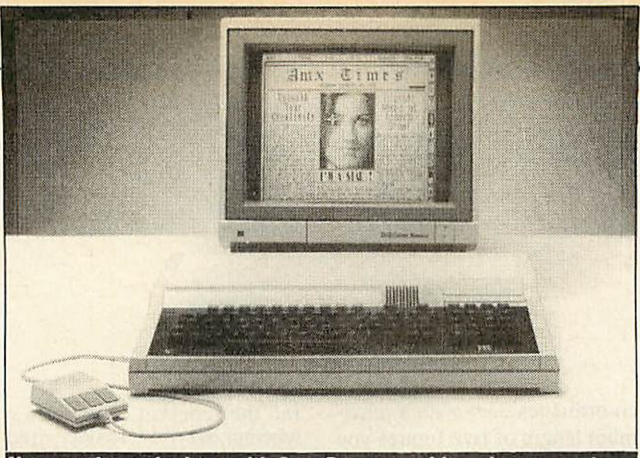
The utility can only be used within the current line. It cannot overflow to the next line and the function does not test whether overflow has occurred. The combined values of len and xcol should not exceed the current screen width.

The function FNslot switches the cursor off and enables the cursor keys to produce Ascii codes and then prints the string at the tab co-ordinates which are specified.

A repeat loop senses the keyboard for the pressing of a key. On pressing the left or right cursor keys the screen cursor moves in the required direction. If the cursor is at the limits set by length and the X co-ordinate the cursor remains where it is and a beep is sounded. If a key is pressed then FNadd is called where the character is inserted within the string using the Basic keywords LEFT$ and RIGHT$. This only occurs if the cursor is not already at the limits.

The pressing of the DELETE key calls FNdel2 which deletes the character and replaces it with a space. Pressing the COPY key calls FNdel which deletes the character at the cursor and closes the gap. Again the Basic keywords LEFT$ and RIGHT$ are used within the delete functions to remove the character and amend the string.

Once editing is complete, pressing RETURN terminates the function and, depending on the type setting, the string is returned or the number in text form is evaluated. If the type setting is set to numeric, only the numeric keys and the decimal point are active.



No more jagged edges with Stop Press graphic enhancement

£10 ENHANCED GRAPHICS

Alan Hodge of Bexley uses AMX *Stop Press* (formerly *Pagemaker*) and was dissatisfied with the quality of graphic output particularly when using the fonts at large sizes.

The problem is the fonts are simply enlarged and not rescaled, so the larger the size, the more jagged the appearance of the font. Alan's program improves the appearance of *Stop Press* fonts and other graphics by smoothing the jagged edges.

This is done by looking for corners on the graphics and then filling in the corners with extra pixels. The program will work on either a selected window or the full screen and will smooth any graphics in the window as well as the fonts.

Some very large fonts may still be a little jagged even after using the enhancer – no problem, simply call up the enhancer again on the same area for further smoothing.

To run the program, type in or load the yellow pages listing and run it. A machine code file called ENHANCE will be produced and saved to disc.

When using *Stop Press*, simply select the window for enhancing and then select the command window to allow you to type a star command. Type *ENHANCE, and the selected window will be enhanced in the manner described.

The program has been tried and tested using the BBC B version of *Stop Press* on both a BBC and Master. As far as Alan is aware, it will not work with the Master version if shadow screen is used.

£10 DFS TO ADFS

Joe Abley from Bedford has produced yet another useful program, this time for ADFS and network users faced with the problem of modifying their DFS software to run under these systems.

Because ADFS and Econet are so different from DFS in the way they store files and directories, modifying programs written for DFS to run correctly under ADFS or Econet can be a real pain.

This is especially relevant to educational software which is inevitably supplied on a DFS disc but which schools want to run on Econet.

The *CheckDodgy* routine in the yellow pages is a Basic program which scans through an ADFS tree, finding all other Basic programs and scanning them for dodgy lines. Any suspicious lines, for example those containing OPENIN, LOAD, CHAIN, star commands and ref-

erences to drives such as:

```
A$=":3."+B$
```

are displayed on screen or on the printout.

This is an invaluable aid when going through the directory, modifying programs to make them work under ADFS or Econet.

The procedure for transferring a DFS disc is now to get all the files off a DFS disc onto an ADFS disc. There are various copiers available for this such as the *CopyFiles* program on the Master Welcome disc. Once the programs are on the ADFS disc you can get around to modifying them.

Run *CheckDodgy* in the directory you copied the DFS files into, printing out the output if possible (this helps) by answering the 'Print' query with 'Y'. You may also type in any star commands necessary to print at this prompt – *PS on a network or *FX 7/8 for serial printers.

You will now have a list of all parts of the Basic programs that may need modifying, which you can then go through, examine, check, and modify.

CheckDodgy is best run in a shadow mode (on a Master/B+), with PAGE as low as possible, as it loads Basic programs into memory for checking.

Obviously, the more memory there is available, the larger the Basic programs can be.

The program works by searching the current directory and recursively searching any subdirectories for files using OSGBPB with A=8. When files are found, the execution address is checked. If this is not &8021/&8023 or &802B it is assumed not to be Basic and is passed over.

Otherwise, the file is opened and a sliding search is made through the file for any star commands, OSCLI commands or the file commands OPENIN, OPENUP, OPENOUT, LOAD and CHAIN. The line numbers in which these commands occur are also reported.

When the program has been completely passed through, the file is closed, the next file in the directory is opened and so on. This is really a very simple program but it is also one that does cut out a great deal of time when you are transferring software in this way.

That's all from me for this month. Keep those submissions coming, particularly on the applications side.

For submissions with programs, remember to include in the text accompanying the disc a full description of how to use the program and, of course, how it works – 500 words is about right.

The text accompanying the program should be included on the disc along with the program. Send your BBC, Master and Electron submissions to Eight Bits, *BBC Acorn User*, 20-26 Brunswick Place, London N1 6DJ.

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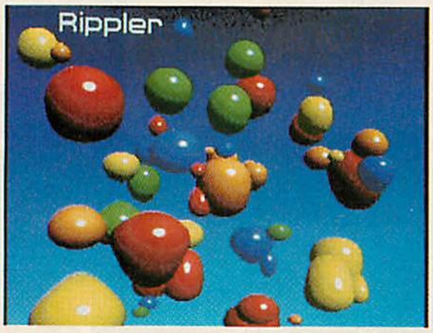
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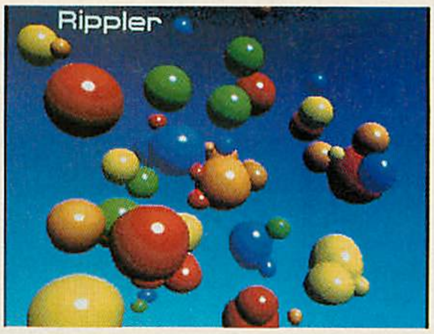
£30 MAKING WAVES

This graphic oddment so far this year comes from Stuart Cupit of Etchingham in East Sussex and £30 goes to him.

You'll need 160K or more of screen memory to run *'Rippler'* (plus 50K or more free for Basic).

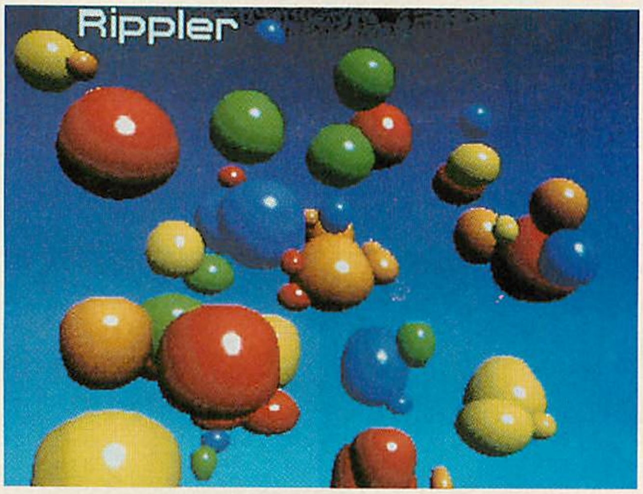
When it's run, you'll be asked if you want to load a screen. Press 'Y' if you do and then enter its name. Otherwise, press 'N' and a simple demo will be drawn. The program operates in mode 13 and the screen shown is included (as 'Screen') on the monthly disc. The screen is then 'rippled' in a fascinating way. Press any mouse button to pause the rippler.





The program works by using two screens – one contains the original picture and one the current 'rippled' version.

A table is built up containing a series of 'ripple factors' – the degree by which each line of the picture is shifted from its normal position. A sine wave is used and the oscillations get progressively stronger, peak and then diminish again.



The machine-code routine checks the rippler table for each line of the original screen and decides which line of the source picture should be shown. This is then copied as quickly as possible from screen to screen using multiple load and store instructions.

You might like to experiment with *Rippler* – try changing the values of the variables 'max', 'speed' and 'anginc'. 'max' is the maximum amplitude of the ripples, 'speed' is the measure of how fast they build up to the maximum level and 'anginc' is the density. Try values of 3, 1 and 0.4 respectively by way of an example

SMALL IS BEAUTIFUL

I mentioned in a previous RR that I would be presenting a Risc OS compatible archiving program. Well, here is the forerunner of the archiver – a general purpose Risc OS file compaction system. The application is called *Scrunge* and you can find it in the form of listings 1 and 2 on the yellow pages.

The general idea is to take one or more files or directories and combine them to form a single file – compacting the data as we go along. There are many situations in which it is useful to do this: when moving lots of files between hard discs or networks using floppies, when sending information over the phone and so on.

To use *Scrunge*, first create a directory called !SCRUNGE. Then enter listing 1 and save it in !SCRUNGE as !RUNIMAGE – this is the main program. Finally, run listing 2 to create the other files needed by the application.

Now *Scrunge* is ready for use. Install the application by double-clicking on !SCRUNGE – the *Scrunge* icon will appear. To combine and compact a set of objects proceed as follows:

- Click on the *Scrunge* icon with the menu button and select Compact from the menu. A save window will appear. It is at this point you specify the name of the file which will contain all the desired objects. Enter the name in the white box (the default is COMPFILE) and then press RETURN or click on OK or drag the save icon to a directory viewer.

The word beneath the *Scrunge* icon will change from Ready to Compact.

- Drag each file or directory to be compacted onto the *Scrunge* icon. They will be included in the combined file, and the hourglass will be shown if the compaction takes more than a moment.
- When all the desired objects have been included, pull up the *Scrunge* menu and select Done. The combined file is complete.

To expand a combined file simply drag it onto the *Scrunge* icon. Each object that you included in the file will be presented in a save window. Just save the file in the standard Risc OS way (for example, by dragging the save icon to a directory viewer).

If you include a directory, all

subdirectories and files therein will be included and, when expanded, will be given their original names.

There are a few obvious restrictions that *Scrunge* checks for. Clearly, you cannot compact a file to itself and any attempt to drag a file onto the *Scrunge* icon while in Expand mode will be met with an error.

Let's examine the main parts of !RUNIMAGE. The polling loop is similar to that of all Risc OS applications. SYS "WIMP_POLL" is called and this returns a reason code indicating the current state of affairs. A CASE statement takes the reason code and performs the required task.

There are only two windows used by *Scrunge* – one containing information about the application and a save window. These were defined using Acorn's template editor. PROCinitwindows opens the template file and calls FNcreatewindow for each window. It also sets 'savetext' which is used whenever a file is saved and puts the current version number of the application in the information window.

FNcreatewindow reads a window definition from the open template file and creates it using Wimp_CreateWindow. There is one feature of FNcreatewindow that you should take note of. The area 'templates%' contains the window definition. If the icons in the window are to be from the common sprite pool, templates%!64 should contain 0. However, it is common to want to use your own sprites without including them in the common pool.

This is done by setting aside some memory and loading into it your own sprite file. In this case, the location templates %!64 should contain the address of your own sprite area for any windows that need to use those sprites. In *Scrunge* I make a point of leaving zero in templates%!64 for the window "Save" because the save icon needs to be changed to whatever is appropriate for the file being saved. The file type icons ("file_xxx") are all found in the common sprite pool. Menus are created by PROCmakemenus.

Life is quite simple in *Scrunge* as there is just one main menu. Every programmer seems to develop his or her own shorthand for creating menus. I do so using a function like FNmakemen in *Scrunge*. This takes two strings (menu data and menu title) and returns the handle of the defined menu. Individual items on the menu are separated by commas and 'extra' features are passed to FNmakemen as codewords preceded by the double bar character |.

Scrunge makes use of two codewords – "win" indicating that the submenu is in fact a window and "lit" which is following by a flag which determines if the item is 'lit' (and hence may be chosen) or not. These codewords are decoded by PROCmenuitem appropriately. For example, the Info option is passed to FNmakemen as "winInfo" and the "in" is recognised by a CASE statement in PROCmenuitem as meaning the information window. You may well want to extend this system to deal with submenus, dotted lines, 'ticked' items etc.

Memory management is often an important part of an application – particularly if it isn't known in advance how much memory the application will require. The Risc OS call 'WIMP_SLOTSIZE' comes to our rescue in this case. Essentially, each application is allocated a number of pages of Ram to live in. This should be specified using *WIMPSLOT in the application's !RUN file. Unless you are going to be dealing with known quantities of data, this initial lump of memory should be used only to house the application and for general workspace. When files are loaded into the application it should ideally claim sufficient extra memory from the Wimp's supply. This can be done using 'WIMP_SLOTSIZE'. In practice, PROCinitheap sets up a heap of memory that is 32K in size to begin with. The call:

```
SYS "Wimp_Slot
Size",-1,-1 TO ap
psize%
```

sets appsize% to the amount of memory that the application currently owns. The same call can subsequently be used to extend this allocation.

Because HIMEM is fixed upon first running the application, any additional memory claimed will be at HIMEM and above and will effectively be independent of the Basic environment. This is all put into practice by FNgetablock which is used to grab a block of memory from the heap. If the heap isn't large enough, FNtrytoextendheap is called as many times as is necessary. Each time the memory allocated to the application is extended by one page (32K on a machine with 1Mb or more) and the heap extended to make use of the new Ram.

One small but useful feature of *Scrunge* is the changing *Scrunge* icon. It is often useful to alter an icon on the icon bar in this way. This is done by PROCupdiconbar which calls 'WIMP_SETICONSTATE' having used PROCstatus to set the required text string.

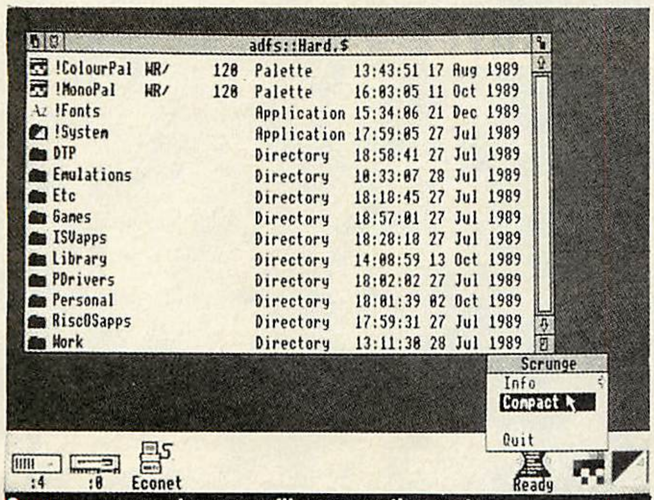
Finally, it's worth looking briefly at the actual compaction process. The method used has been seen before in *Agora* – the forerunner of *Risc Revue*.

A piece of machine code is assembled to do the very hard work and this needs to be fast, especially considering the job in hand.

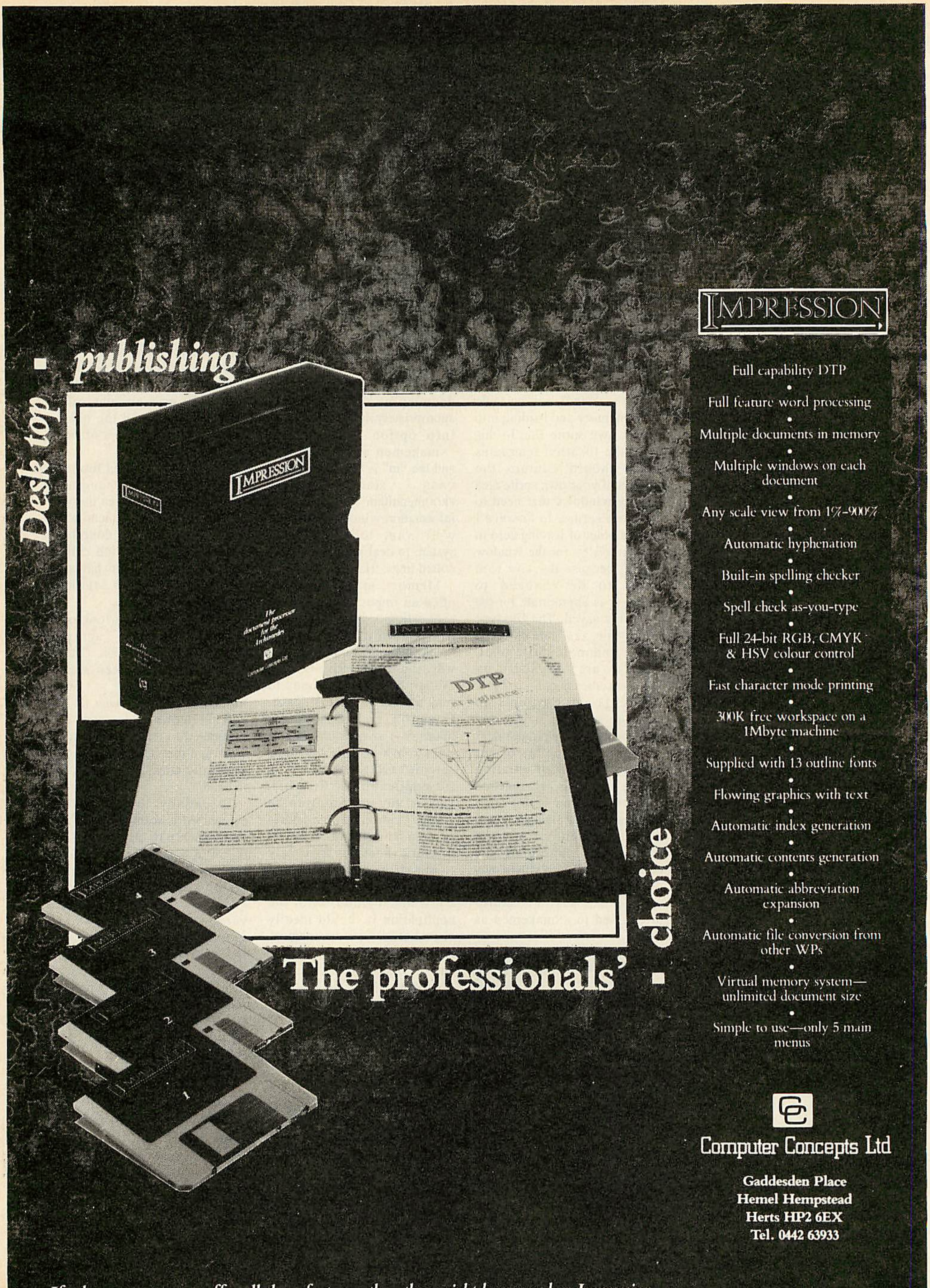
Essentially, the file to be compacted is scanned to see if any sequence of characters is a repeat of a previous one. If so, the sequence is encoded. This method can reduce quite effectively the sizes of a wide variety of file types (text, graphics etc) but is a little time-consuming. Fortunately, expansion of the compacted data is much faster. A simple, recursive system of procedures is used to include whole directory structures in the combined file.

Again there is nothing very new about this – we've seen dozens of similarly recursive techniques in these hallowed pages before.

As ever, programs, ideas, hints and tips are most welcome – please send them to me, David Acton at Risc Revue, *BBC Acorn User*, Redwood, Publishing, 20-26 Brunswick Place, London N1 6DJ.



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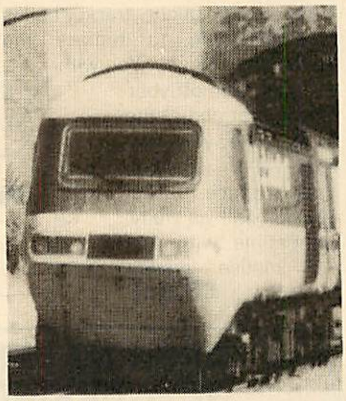
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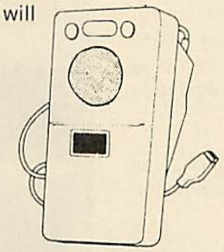
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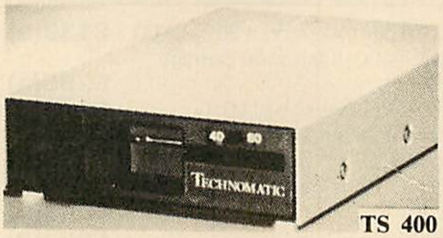
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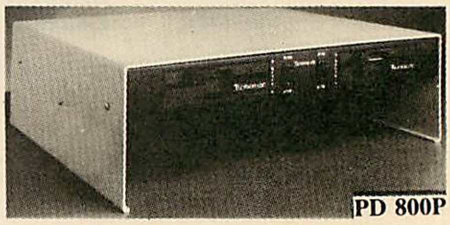
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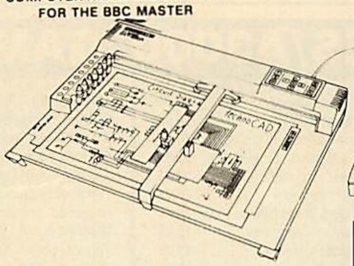
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The major features offered are:

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- ★ Unique ability to create complex icons made up of upto 500 lines instead of the usual 15 to 20 pixels, store them in a library and recall them at different scales and orientations.
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- ★ Text entry at any 90° orientation anywhere on the screen.
- ★ Grid scaling and locking, displacement measurements.
- ★ Printer routine for FX80/100 compatible printers.
- ★ Cursor control from keyboard/tracker ball/mouse.

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The Fourth Dimension

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"The game is very playable and you do get a feeling of involvement as you knock the ball into the corner of the net straight past the diving goalie. It's definitely one to play again, and if you've enough friends it could make for a good day of enjoyment - and not a lot of games do that. Value for money...10 out of 10" ***The Micro User Oct '89***

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"The 3D perspective graphics are stunning" ***Electron User GOLDEN GAME June '89***
"Holed Out is great.....The game plays very well and the graphics are superb."
Popular Computing Weekly, March 1989
"The best golf simulation I've ever seen on any Acorn machine." ***The Micro User, June '89***
"The Electron version is brilliant - it's almost the same as playing at Gleneagles. Unreservedly recommended."
A & B Computing Game of the Month, June '89

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U.I.M. (ULTRA INTELLIGENT MACHINE) The Fourth Dimension

Possibly the most exciting BBC release for a long time. U.I.M is a massive 3D vector graphic action adventure set in the future. The greenhouse effect has melted the icecaps and all life now exists in hundreds of colonies under the sea. You must travel the oceans, completing missions, trading in currencies, commodies and shares in search of the U.I.M. There are many types of ship you will encounter in your highly manoeuvrable futuristic submarine and you must develop your weaponry and equipment to deal with the challenges you will face. U.I.M. is an opportunity to step into another world. It will fascinate you for weeks and possibly months to come.
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"Will I keep playing it the way I've played Elite for years? And the answer is yes. Graphics 10, Playability 10, Value for Money 10" ***The Micro User, Nov' 89.***

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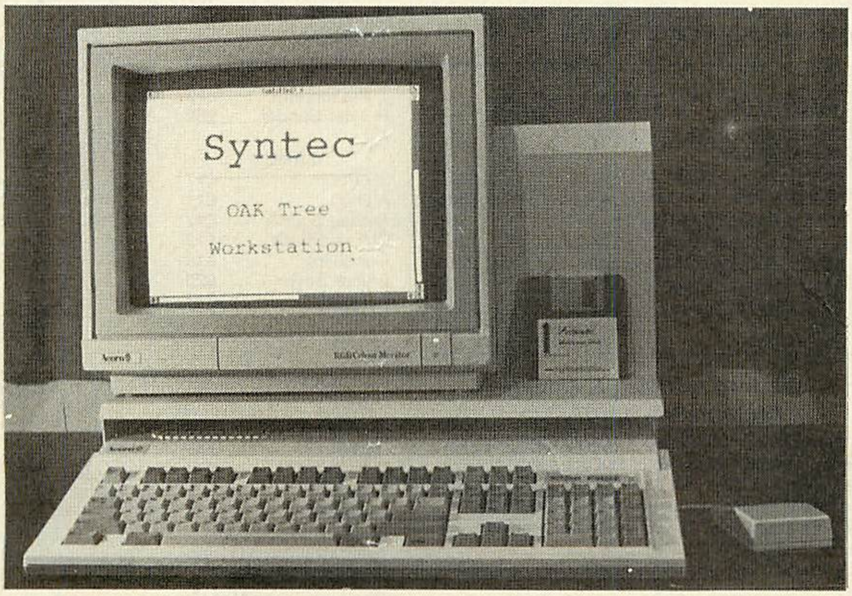
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EXPAND YOUR A3000 COMPUTER

WITH THE *Syntec* Oak Tree



- ★ Accepts standard A300 and A400 expansion cards, 4 simple podule and 1 Memc/simple podule
- ★ Internal switch mode power supply providing +12V, +5V and −5V
- ★ Integral Monitor stand
- ★ Power socket for A3000 and monitor
- ★ Single illuminated power switch for A3000, monitor and Oak Tree
- ★ Optional internal winchester disc (available Feb 90)
- ★ Integral disc rack for 8 disks

Minimises desk footprint and converts the A3000 into an expandable workstation. High quality steel construction in matching beige finish.

299.*00 inc VAT

- ★ Plus £12 p&p
- ★ Not including A3000 computer and monitor

SYNTEC,
18 YELLOWHAMMER COURT,
KIDDERMINSTER
DY10 4RR
TEL: 021-373 9858

Watford Electronics

Jessa House, 250 Lower High Street, Watford WD1 2AN, England
Tel: Watford (0923) 37774 Tlx: 8956095 Fax: 01 950 8989
Shop Hours: 9am to 6pm (Mon.-Sat.) Thursday 9am to 8pm. FREE customer car park.
All prices exclusive of VAT; subject to change without notice & available on request.
Credit Card Orders (ACCESS & VISA) Tel (0923) 33383 or 50234 (24 Hours)

Acorn — The choice of Experience

The choice before and after the experience

Archimedes micro

System	Basic	Mono	Colour	Multiscan
310	£899	£959	£979	£1294
410/1	£1199	£1259	£1388	£1594
420/1	£1699	£1759	£1878	£2094
440/1	£2499	£2559	£2678	£2894

(Securicor carr. £10 on Archimedes)

A3000 – MICRO

12 MONTHS FREE MAINTENANCE ON SITE

- A3000 Archimedes Microcomputer £649
- 3.5" External Drive £85
- Monitor Stand £22
- Twin Monitor Stand £–
- External Podule Case £14
- Serial Upgrade £19
- Dust Cover Micro only £4
- Dust Cover for Micro + Monitor £7
- User port/MIDI upgrade £49

Unbeatable WINTER SALE

Offers on Archimedes Micro

When you purchase an Archimedes Micro from Watford, look what you get FREE with it

Micro	Free Offer
A310	A Real Time Video Digitiser worth £249
A410/1	Upgraded to 2MB RAM & a 20MB Hard Disc, worth £299 (A420)
A420/1	Upgraded to 4MB RAM & a 40MB Hard Disc, worth £679 (A440)
A440/1	A TAXAN 770+ 14" Multisync Monitor
A3000	Upgraded to 2MB, worth £159

ACCESSORIES

- NEW Multitasking RISC OS £29
- MEMCI Upgrade £68
- ARM 3 Upgrade £575
- ROM Podule Acorn £45
- ROM Podule (Computer Concepts) £45
- ROM Podule (C C) with Battery Backup £59
- 2 Podule Backplane (Watford) £25
- 4 Podule Backplane (Watford) £35
- Backplane FAN only (for Hard Disc) £8
- 3.5" 800K 2nd Floppy Drive (305/310) £115
- 5.25" 800K external Floppy Drive £85
- I/O Podule (with Analogue port, User port, & 1MHz bus) £80
- MIDI add-on to I/O Podule £29
- MIDI Expansion Card £65
- Sound Sampler Mono (Armadillo) £129
- Sound Sampler Stereo (Armadillo) £166
- Sound Sampler Stereo /Midi (Armadillo) £186
- Chromalock Podule (Wild Vision) £275
- Econet Network Board £46
- Archimedes IEEE Interface Adaptor £269
- Dual RS232 Podule £195
- 16 bit parallel I/O Card £195
- NEW – Archi MK II Replacement Mouse £39
- RB2 – An Archimedes Marconi Tracker Ball £47
- PC Emulation Pack incl. MSDOS 3.21 £62
- Software Developers Toolbox £175
- Floating Point Unit £549
- SCSI Adaptor Expansion Card £185
- Archi Real-time Digitiser £249
- Archimedes RISC-OS Reference Manual £79
- Arm Assembly Lang. Prog. Manual £15
- Archimedes BBC Basic Guide £20
- Keyboard Extension Lead £6

0% FINANCE

We are once again able to offer 0% finance for the purchase of an Archimedes or BBC Master micros and some peripherals. For further details please write in or telephone: **0923 37774 ext. 223, 203 or 201**

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Archimedes Micros, BBC Masters, Philips, Microvitec, and Multiscan COLOUR Monitors. Also on the full range of Panasonic Printers.
Should your machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours to repair the unit.
(P.S. This offer is over and above our Unbeatable Winter Sale Offers on Archimedes Micros).
(Offer applicable only when bought at prices advertised in this advert).

Archimedes Special Upgrades

The impossible is now possible. Watford's Ram booster system adds more Ram to your Archimedes. Upto 2 and 4 Megabytes for A3000 and 2 & 4 Megabyte kits for the A300 & 400* series.
(* For A400 series we also supply low cost Hard Disc upgrades too.)

Convert your Archi 410 to a 420 or 440 with Watford's unique Upgrade Kits

- UP10 – 1MB RAM + 20MB Hard Disc £275
- UP20 – 2MB RAM + 20MB Hard Disc £425
- UP30 – 3MB RAM + 40MB Hard Disc £569
- UP40 – 3MB RAM + 53MB Hard Disc £669

(P.S. When purchased with an A410/1, the upgrades will be fitted at no extra cost)

Archimedes RAM Upgrade

All our memory upgrades are simple to fit. No soldering required.

- A3000 Watford 1MB RAM Upgrade £129
- A3000 Watford 4MB RAM Upgrade £349
- A305 0.5 Meg RAM Upgrade £99
- A305/310 2Meg RAM Upgrade £285
- A305/310 4Meg RAM Upgrade £499
- A410/1 RAM Upgrade to 2 MB £109
- A410/1 RAM Upgrade to 4 MB £319

(Carriage on Add-ons £3)

Watford's 20Meg & 40Meg Archimedes Hard Disc

Watford Electronics' 20Meg & 40Meg hard disc fits internally into the Winchester slot provided.
It is fully compatible with Acorn's hard disc upgrade, (the only difference is our low price). Price includes the Hard Disc Drive, Controller Podule & fitting instructions.
P.S. The 310 upgrade requires a backplane and a fan.

- 3HDP – Hard Disc Podule only £175
- 3HD20 – 20Meg H' Disc + Podule for 310 £319
- 3HD40 – 40Meg H' Disc + Podule for 310 £439
- 2 Podule backplane (Watford) £25
- 4 Podule backplane (Watford) £38
- Fan for the backplane £8
- 4HD20 – 20 Meg Hard Disc for 410 £169
- 4HD40 – 40 Meg Hard Disc for 410 £285
- A3000 Hard Disc Podule only £195
- A3000 20 Meg Hard Disc + Podule £369
- A3000 40 Meg Hard Disc + Podule £489

(Carriage £7)

Desk Top Publisher

- Acorn's Archi DTP Package £125
- Impression DTP Package £135

WORDPROCESSORS

- Wordwise + Disc £17
- Image Writer £25
- Interword ROM £35
- 1st Word Plus £71
- Archie Spell Master £39
- Pipedream 3 £125
- Pipedream £89
- P.Spellchecker £40
- View £45
- Viewspell £32
- Viewindex £12
- Graphic Writer £23

DATABASES

- AlphaBase £36
- Viewstore £45
- Flying Start II £77
- System's Delta + £55

SPREADSHEETS

- Intersheet ROM £35
- Sigmasheet £55
- Viewsheet £45

BUSINESS GRAPHICS

- GammaPlot £50
- Interchart Disc £17

INTEGRATED PACKAGES

Logistix – Database, Spreadsheet, Time Management & Business Graphics £89
Pipedream 3 – Wordprocessor, Database & Spreadsheet £125
(P&P on above £2)

GRAPHICS, ART, DESIGN & GAMES

GRAPHICS

- Atelier £84
- Artisan II Disc £49
- Pro Artisan £82
- Archeffect £20
- Autosketch £69
- Autosketch II £75
- Gamma Plot £60
- Graph Box £64
- Kermit £46
- Lingenuity Presenter II £39
- Render Bender £59

GAMES

- 3D Pool £17
- Alerion £11
- Arcade Soccer £17
- Clares 3 Pack £12
- Conqueror £19
- Enthar Seven £22
- E-Type £17
- E-Type Designer £15
- Freddy's Folly £10
- Holed Out Designer £17
- Holed Out Golf £17
- Hyperpack (12) £79
- Hoverbod £11
- Ibix the Viking £14
- Inter Dictor £25
- Jet Fighter £10
- Minotaur £11
- Missile Control £11
- Orion £12
- Pacmania £14
- Repton 3 £17
- Thundermonk £11
- Zarch £15

Miscellaneous

- Arc TFS £25
- Toolkit (Beebug) £32
- Toolkit (Clares) £42
- Hearsay Comms Pack £55

SILICON VISION Corner

- Data Vision £74
- Gerber Plot £93
- Risc Basic £74
- Solid CAD £74
- Super Plot £22
- Film-Maker £59
- Office Tools £219
- ROBO LOGO £54
- Share Holder £74
- Solids Render £59
- Arc PCB Professional £275
- Gate Array Design System £67
- Financial Accounts £129
- Realtime Solids Modeller £110
- Solid Tools £199

LANGUAGES (Archimedes)

- ISO-PASCAL; FORTRAN 77 £86 each
- ANSI C Release 3 £139
- Assembler; LISP or Prolog X £155 each
- LOGOTRON LOGO £55
- ROBO LOGO £56
- RISC BASIC £85
- TWIN EDITOR £25
- BASIC Compiler £89

(P&P £2 on above packages)

MINERVA's Archimedes Software

Sigmasheet	£55	Sales Ledger*	£53
Home Accounts*	£40	Purchase Ledger*	£53
Stock Manager*	£53		
Nominal Ledger*	£53	Reporter	£29
Ancestry	£59	Mailshot	£29
Gammaplot	£50	MultiStore	£249
System Delta+	£55		
System Delta + Reference Manual			£25
Order Processing/Invoicing*			£53
School Administrator			£99

** Requires System Delta*
(P&P on above items £2)

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.

New RISC OS Version **Only £15**

Archimedes 5.25"/3.5" Disc drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. NO SOLDERING is involved. Supplied complete with necessary lead.

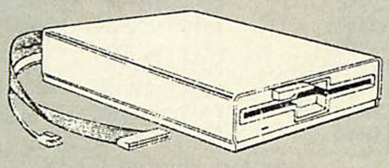
Only £21

12 MONTHS FREE MAINTENANCE ON SITE

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) £439 *(carr £7)*

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

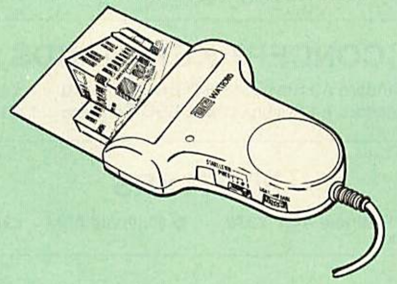
Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.
FREE with every BBC Master purchased from us during February

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module		£115
Econet Module for the Master		£47
Twin ROM Cartridge for Master		£8
Quad ROM Cartridge for Master		£12
Master Reference Manual I	(No VAT)	£14
Master Reference Manual II	(No VAT)	£14
Master Advance Ref Manual	(No VAT)	£17
64K Upgrade Kit for B+		£32
Acorn 1772 DFS Kit complete		£49
ECONET Upgrade Kit for BBC B		£42
ALL ECONET UPGRADES Available		
ARIES' IEEE Interface for BBC B & Master		£238
Morley Teletext Adaptor with ATS Rom		£99
Filestore E01S £899	Filestore E40s	£799
Filestore E60S £1080	Ecolink	£270

(Carr. £2 to £7 depending on the weight)

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system. The package includes the most comprehensive utility software available for the Archimedes, a high quality, ergonomically designed to fit the shape of your hand, (see drawing above) scanner, which is fitted with a warning LED that will indicate if the scanner is being moved too quickly for accurate results. Additional twin guide rollers ensure precise tracking over the image, to make the best use of the high resolution available with this sytem. The yellow/amber illumination of our Mk II scanner, enables you to achieve optimum accuracy. It is capable of scanning upto an amazing 400 DPI. The scanning area is 4" wide and the height is only limited by the maximu amount of memory available.

On board ROM software supplied, is the most sophisticated Archimedes scanner software yet written.

Launch offer £149 (P&P £4)
(Please write in for technical details)

Z88 Portable Micro



Watford Electronics are the largest Z88 Dealer in the UK

Only: **£195** (Carr £4)

FREE

With every Z88 purchased from us this month, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

32K RAM Pack or 32K EPROM Pack	£18.00
128K RAM Pack or 128K ROM Pack	£45
512K RAM Pack	£175
Z88 Eprom Eraser Unit	£35
Z88 Spellmaster for Pipedream	£51
Z88 Carrying Case	£9
Z88 Computing Book	£9.95
AA Nicad Rechargeable Battery	£1.50
Battery Charger Compact & Fast	£6
Z88 Serial Printer Cable	£9
Z88 Parallel Printer Cable	£25

● Z88 to BBC Link	£20	● Z BASE	£56
● Z88 to PC Link II	£30	● Z TAPE	£42
● Z88 to Macintosh	£52	● Z TERM	£42
● Z88 Mains Adaptor	£9	● Z88 Modem	£149
● Z88 to Archimedes Link			£TBA

By popular demand, we are now supplying refurbished and fully guaranteed BBC Micros with Disc Filing System
(Please telephone for price & availability)

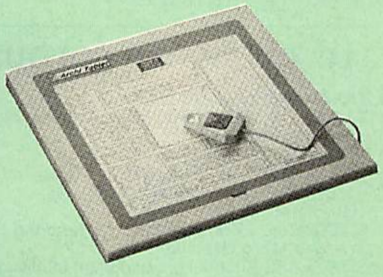
FINANCE AVAILABLE

In these days of expensive borrowing, we are pleased to have negotiated a special low rate finance deal for our customers, with flat interest rate of 12.25% per annum, typical APR 25.5%.

In addition to the above, we are able to offer all Archimedes and BBC Master computers as well as selected hardware on a 0% interest free finance deal.

For further details please telephone: 0923 37774 ext 223/203/201.

Archi Graphic Tablet



This package allows Archimedes users to take advantage of the low cost graphpad (sometimes called a digitiser tablet, but not to be confused with a video digitiser!)

The Archi Graphpad offers performance and accuracy comparable to other graphics tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely.

The software, which is in the form of a relocatable module (RM), intercepts the system calls which control the mouse, and so allows virtually all mouse based Archimedes software to be controlled using the tablet without any modification. The only exceptions are programs which use the serial port, as the tablet is physically connected to this port itself.

Graphics programs such as Artisan, Pro Artisan, AutoSketch, Oak DTP, and the RiscOS Draw, Paint and DTP packages are considerably enhanced by the use of the graphics table as opposed to the mouse, although it can, of course, be used with any other mouse driven application.

The software allows the user to define how much of the tabler's 12" x 12" working area to use, allowing very fine control when drawing freehand or tracing from a variety of differently sized drawings, diagrams, photographs, etc.

The tablet driver is compatible with all Archimedes machines, and with both Arthur and RiscOS operating systems.

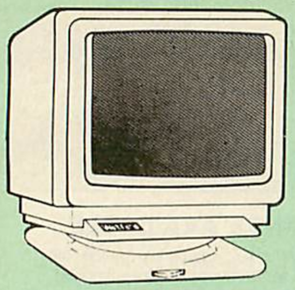
The pointer is moved via a four button puck complete with transparent lens and crosshairs for optimum accuracy. Three of the buttons emulate the Archimedes mouse buttons precisely, the fourth being used for special functions such as setting the position and size of the active working area. The buttons may be remapped to allow the relationship between tablet and mouse buttons to be redefined, should this be required.

The software is supplied with a special adaptor lead to connect the tablet to the Archimedes' serial port, and a power lead which plugs onto the Archimedes' main board.

Special Price £249 (carr. £4)
(Price includes Tablet, Leads & Software)
Stylus Optional Extra **£29**

Continued→ → → → → → → → → →

MONITORS



12 months FREE maintenance on site

MICROVITEC 14"

- **1431** – Standard resolution as used on the BBC television computer programme £175
- **1451** – Medium resolution, suitable for word processing in mode 0 £219
- **1455** – MS Medium resolution, ideal for Archimedes £220
- **1441** – High res, exceeds the capabilities of the BBC Micro £359
- **1431AP** RGB + PAL and AUDIO £199
- **1451AP** RGB + PAL and AUDIO £255
- **2030 CS** 20" Med Res £380
- **2040 CS** 20" Hi Res £675
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen** £239

14" MULTISCAN COLOUR

- **TAXAN** Multisync 770 Plus £389
- **TAXAN** 770 LR Low Radiation, autoscanning Ultra High Res £429
- **TAXAN** Multiscan 870 16" Monitor £575
- **TAXAN** Viking 19" Paper White, High Resolution (1152 x 896 with Archi 400 series) £799
- **EIZO** 8060H – For technical info. read the review in Micro User, Jan. '89 £389
- **EIZO** 9060S Super High resolution multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch £469

TAXAN 12"

- Super Vision 3 – **Type 625** Super Hi-res RGB Colour, Green/Colour Switch £269

PHILIPS

- **BM7502** 12" Hi-res Green Monitor £64
- **BM7522** 12" Hi-res Amber Monitor £68
- **CM8833** 14" Med. Res Colour Monitor £219

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £189

Dust Cover for Philips Monitors £6
(Securicor carriage on Monitors £7)

SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the monitor viewing angle.

for 12" Monitors **£8** (carr. £2.50)
for 14" Monitors **£12** (carr. £2.50)

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

Price £12

SPARE LEADS

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

CONCEPT KEYBOARDS

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117

PLOTTERS

- Plotmate A4S **£379**
- Plotmate A3M **£549**

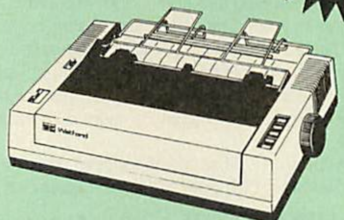
Roland Plotters

(Official Roland Appointed Distributor)

- **DXY 880A £499**
- **DXY 1100 £615**
- **DXY 1200 £835**
- **DXY 1300 £1015**

12 months FREE maintenance on site

Panasonic KX-P1081



SALE OFFER only: **£127**

(Price includes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us)

KX-P1180 Printer Offer

Panasonic KX-P1180 printer, Dump Out 3, Screen Dump ROM & a BBC printer lead.

Offer Price £136

Panasonic Printers

- **KX-P1124** 24pin 80col. 192/63 CPS £225
- **KX-P1180** 9pin 80col. 144/38 CPS £146
- **KX-P1540** 24pin 136col. 240/80 CPS £435
- **KX-P1592** 9pin 136col. 216/45 CPS £275
- **KX-P1595** 9pin 136col. 288/61 CPS £355

- **Panasonic KX-P4450i** LASER PRINTER Latest technology at Watford's special offer price **£1,325**
- Spare Toner **£29**
- A4 Feeder **£55**
- Drum Unit **£149**
- Developer **£115**
- 1MB RAM Board **£299**

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-P1124 (P36)	£85	KX-P1180 (P37)	£79

BUFFERS

P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17 P1081/1592	£32	P19 P1124/1180	£55

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	£8
P115 for KX-P1180	£8
P145 for KX-P1124	£8
P140 for KX-P1540	£10
Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	£9.95 each

INTEGREX COLOUR JET

- Colour Jet 132 Printer £515
- Paper Roll £6.50
- Screen Dump Software £10
- Colour Cartridge £16.50
- Black Cartridge £10.35
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

NEW – Intergrex COLOURCEL NPQ Ink Jet Colour Printer £2,695

Citizen Printer

Swift 24 £245

NEC P2200 PINWRITER £225

Pinwriter Serial Interface (optional)	£55
P2200 Cut Sheet Feeder	£59
Additional Font Cartridge	£25

NEC PINWRITER P6/P7 Plus

NEC P6+ 80 columns	£439	NEC P7+ 136 columns	£575
Colour Option	£74	Serial Interface	£73
Cut Sheet Feeder	£125		
NEC Ribbons for		P6 £8;	P7 £9.50

Hewlett-Packard Printers

HP Quiet Jet Plus	£425
HP Desk Jet Plus	£525
HP Paint Jet Colour	£649
HP LaserJet Series IIP	£825
HP LaserJet Series II	£1275

12 months FREE maintenance on site

Star Printers

Star LC10	£139	LC10 Colour	£195
Star LC24-10	£215	XB24-10 Colour	£410
NB24-10	£410	XB-10 Colour Kit	£24
LC10 Colour Ribbon	£5	Cut Sheet Feeder	£55

EPSON PRINTERS

EX800	£419	LQ860 Colour	£529
EX1000	£564	LQ1050	£575
FX850	£319	LQ1060	£655
FX1050	£415	LQ2550+	£915
FX1060	£679	LX400	£135
GQ3500 Laser	£999	LX850	£195
LQ400	£205	SQ850	£525
LQ850	£405	SQ2500	£899
LQ550	£259		

CUT SHEET FEEDERS for

EX800/FX800/850/LQ800/850	£130
FX1000/LQ1000/1050	£175
LQ2550	£390
LX400/800/850/LQ400/500/550	£69

TRACTOR FEED for

LQ800 **£44**; LQ850/FX850 **£69**; LQ1050/FX1050 **£85**; LQ2500 **£90**; LQ2550 **£90.**

ACCESSORIES

- EX800/1000 Colour Option £55
- EX800/1000 Colour Ribbon £14
- LQ2500 Colour Option £65

(Securicor Carriage on Printers £7)

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£40	RS232 + 8K Buffer	£79

PRINTER LEADS

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 1 metre	£6
Nimbus Centronics Lead	£6
IBM Parallel Lead 1 metre	£6
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper £7
- 2,000 Sheets 9.5" x 11" Fanfold Paper £11
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold £19
- 1,000 Sheets 15" x 11" Fanfold Paper £9
- 1,000 Sheets true A4 Fanfold Paper 70gms £11
- 2,000 Sheets true A4 Fanfold Paper 70gms £19
- Teleprinter Roll (Econo paper) £4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

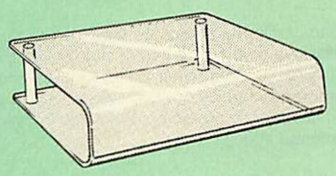
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£5.00
1,000 90 x 36mm (Twin Row)	£4.90
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

Perspex Printer Stand



Give you Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version **£16** (carr £3)
136 Column version **£20** (carr £4)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and refold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

80 Column version £23 (carr. £3)
132 Column version £26 (carr. £4)

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£3.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£3.95	£4.50
RX/FX80/MX80	£3.00	–
DMP2000	£3.75	£4.75
EX/LQ800	£4.50	£4.50
EX/LQ1000	£6.75	£5.00
RX/FX80/85/800/MX80	£3.25	–
RX/FX100/1000	£5.00	–
Kaga/Taxan KP810/815	£4.90	£5.00
LC10 (Black)	£4.25	£5.00
LQ500/800	£3.75	£5.00
LQ1050/LQ2500	£7.00	£5.50
LX80/86/800/850	£3.25	£4.50
M1009/GLP	£3.80	£3.75
NEC P2200	£6.00	£5.00
Panasonic KX1080/81	£3.50	£4.75
Panasonic KX-1124	£8.00	£5.00
SQ2500	£23.00	£5.50
Star NL10	£3.75	£4.50
Olivetti Ink Jet Cartridges (set of 4)	£9	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Universal Printer Sharers/Changer

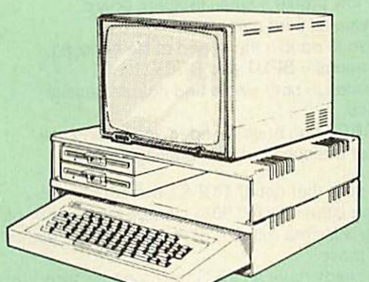
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£20	£22	£3
3 to 1	£27	£30	£3
5 to 1	£36	£39	£4

(Cables extra at £6 each. Please specify type required when ordering)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



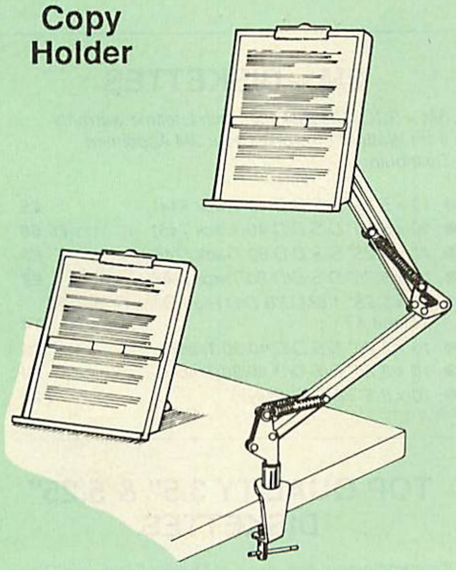
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Printer Plinth	420 x 310 x 105mm	**£12**
Single Master Plinth	490 x 310 x 105mm	**£14**
Double Master Plinth	490 x 310 x 210mm	**£26**

(Carr. Single plinth £2; double plinth £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding you paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

Handy Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

Compact AB Switch Centronics **£19**
Compact AB Switch RS232 **£18**
(Cables extra at £6 each)

MEGABUFFER 256



The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatiblity with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in text unit for both the buffer & your printer.

Only £119 (carr £5)

Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms, see the feature in our advert.

THE EPSON RX-FX-KAGA
Printer Commands Revealed

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you are with all sorts of printouts to show its capabilites – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

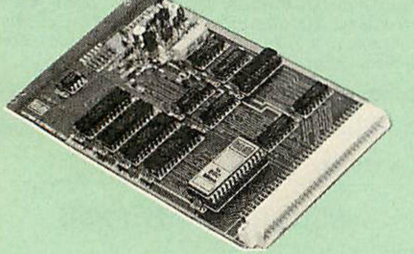
It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Continued→ → → → → → → → → →

Archimedes Real-Time Digitiser

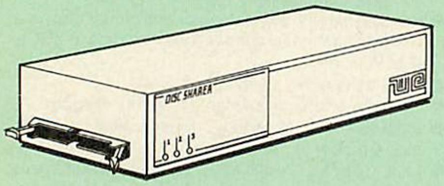


Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £249

A Set of Colour Filters for colour image grabbing using a video camera £16

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price : **£65** Price includes 3 Cables

DISC PLONKER RACK



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk.
Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

- Watford sophisticated DFS ROM **£16.00**
- Watford DFS Kit complete **£69.00**
- We will exchange your existing ROM for Watford's ultimate DFS ROM at only **£12.00**
- DFS Manual (comprehensive) **£6.95**
- Acorn DNFS ROM **£17.00**
- Acorn ADFS ROM only **£25.00**
- Acorn 1772 DFS ROM Kit **£49.00**

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1770

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00.**

- SPECIAL PRICE **£44.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

DUST COVERS (For our Disc Drives)

Single CLS (without PSU)	£3.20
Single CS (with PSU)	£3.25
Twin CLD (without PSU)	£3.85
Twin CD (with PSU)	£3.90

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

- *10 x 5.25" S/S D/D 40 Track 744)* **£5**
- *10 x 5.25" D/S D/D 40 Track 745)* **£6.50**
- *10 x 5.25" S/S D/D 80 Track (746)* **£8**
- *10 x 5.25" D/S D/D 80 Track (747)* **£9**
- *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT* **£14**
- *10 x 3.25" S/S D/D 40/80 Track* **£9**
- *10 x 3.25" D/S D/D 40/80 Track* **£9**
- *10 x 3.5" High Density* **£25**

TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 x **M3** 3.5" D/S D/D 80 Track* **£9**
- *10 x **M9** 3.5" D/S High Density* **£22**
- *10 x **M4** 5.25" S/S D/D 40 Track* **£5**
- *10 x **M5** 5.25" D/S D/D 40 Track* **£7**
- *10 x **M7** 5.25" D/S D/D 80 Track* **£9**
- *10 x **M8** 5.25" D/S H/D Hi-Density* **£14**
- ***M2** 3" Double Sided* **£3 each**

Special BULK OFFER on 5.25" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PR!CES SLASHED

BULK PACK DISCS in lots of 100

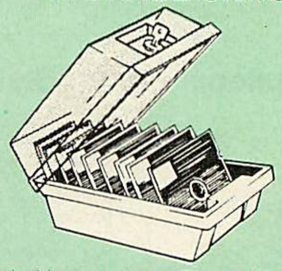
Type	S-S 40T	D-S 40T	D-S 80T
Without Sleeves	£30	£35	£40
With Sleeves	£33	£38	£43

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

ANTISTATIC LOCKABLE DISC STORAGE UNITS

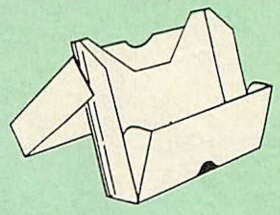


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** – holds up to 50 5.25" discs **£4.95**
- **M85** – holds up to 95 5.25" discs **£6.95**
- **M25*** – holds up to 25 3.5" discs **£4.95**
- **M50** – holds 50 3.5" discs **£6.50**
- **M10** – holds 8 of No. 10 Data Cartridges **£15**

* Not lockable

PLASTIC LIBRARY CASES



Holds up to 10 5.25" Discs. **Only £2.00**

DISC ALBUMS

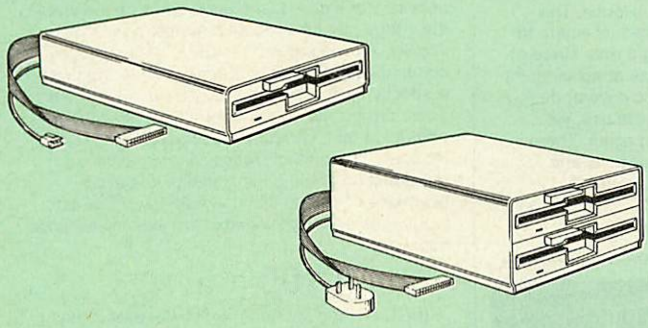
Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.
This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with an Utilities Disc.
The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public. If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. **Ideal for Schools & Colleges.** We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £18. (At Watford we anticipate your needs of tomorrow, not just today!)*
When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 4th page of our advert for the Plinths).
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £75	CLD400 £168	CS 400S £85	CD400 £188
800K (1,44M		CLD 800S £153		CD 800S £163

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £6 to £7

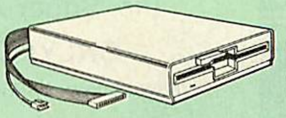
Prefix ***C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

Suffix ***S** = 40-80 Switchable*

e.g. *CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.*

Cable to connect 5.25" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Special 40/80 Disc Drive/DDFS Mk II Offer

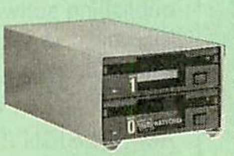


● The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.

● Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.

● A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)



3.5" DISC DRIVE OFFER

These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

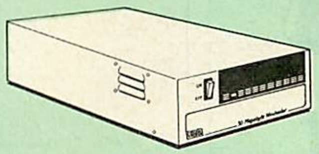
Drives to connect to BBC Micros own PSU

● CLS35 400K Unit £65 ● CLD35 Twin 800K £119

Drives with built-in Power Supply Unit

● CS35 Single 400K £85 ● CD35 Twin 800K £129

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).

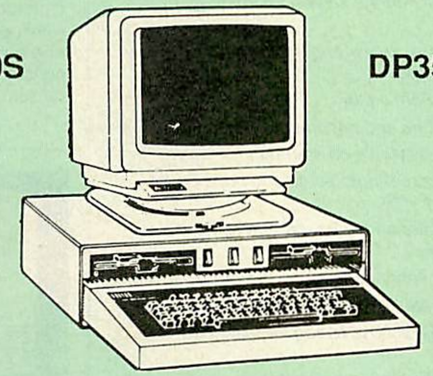


WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.
This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.
Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!
Compatible with the Master, and the BBC B (with 17 X disc interface).

● 30 Megabyte BBC Hard Disc **£369** (carr £9)

CDPM 800S DP35-800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC B & Master £175

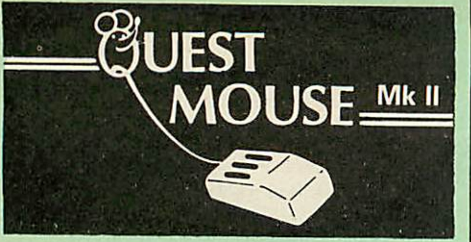
A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.
To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.
The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £165

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →



- Quest Mouse II & Quest Paint £58
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont £89
- Quest Mouse II only £29
- Quest Paint Software only £34
- Quest Font Disc (22 Text Fonts) £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Part Exchange your unreliable AMX Mouse for a Quest Mouse for only £22

(P.S. Quest Paint is not compatible with BBC Compact)

Winner of the BBC Acorn User 1990 Award for the Best Art/ Graphics software



ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

NEW

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £39

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£52

THE NEW Mk III AMX MOUSE

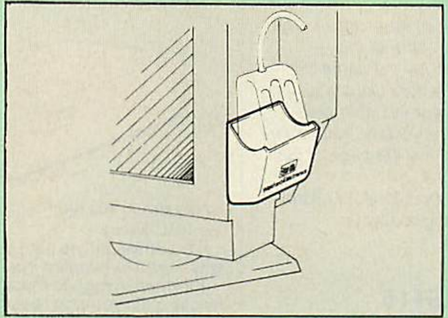
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

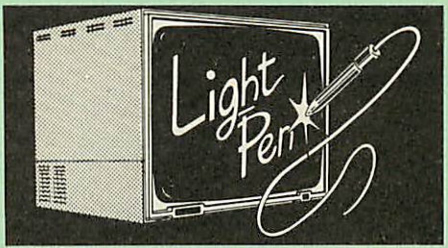
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE MOUSE HOUSE



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk. It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4



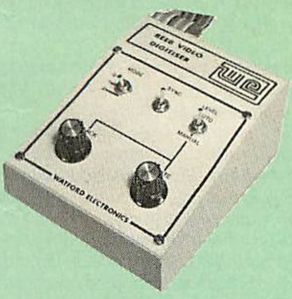
Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional ★ commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image. Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

Magazine Maker

(As seen on TV)

A combination of Stop Press and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Stop Press to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Stop Press's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Stop Press's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in Wordwise and View files plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)





Winner of the BBC Acorn User 1990 Award for the Best Art/ Graphics software

The WAPPING EDITOR

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

PAGE LAYOUT SECTION

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module is a mode 0 version of the highly acclaimed Quest Paint package, detailed elsewhere in our advert, and incorporates all the same drawing facilities, e.g. pencil, brush, airbrush, polygon, circle, ellipse, fill, cut-and-paste, etc., etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

WORD-PROCESSOR

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

THE FONT EDITOR

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Upgrading to the Wapping Editor could not be easier since the font editor will convert fonts from other packages, such as Quest Paint or Stop Press (formerly Pagemaker), into Wapping Editor format and a mode conversion utility will convert any screen in modes 1, 2, 4 or 5 into a full grey-scale mode 0 screen. Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser, either independantly or from within the Wapping Editor package.

Wapping Editor Software Pack	£69
Wapping Editor plus Mouse	£89

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

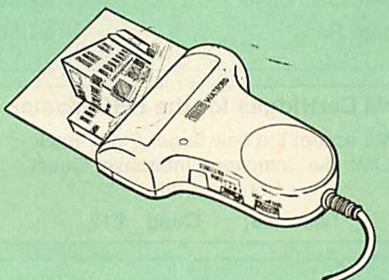
Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

The Beeb HandScan
Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

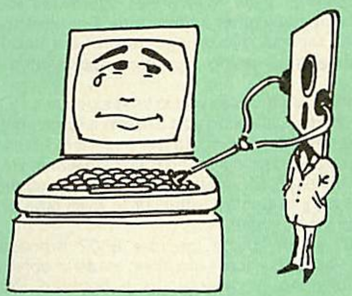
Beeb HandScan & Firmware	£135

Wapping Font Disc

Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

(Only suitable for BBC B with 8271 DFS)

> Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms see the feature in our advert.

NEW

Beeb DOS 2.2

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual. (Will only work on 360K Disk Drives)

Price: £39

(Please write in for technical literature)

Continued→ → → → → → → → → →

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:	Aries B-12	£36
	Aries B-12C	£5

ARIES B-488 IEEE-488 INTERFACE UNIT

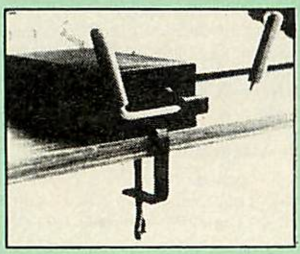
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

VOLTMACE JOYSTICKS

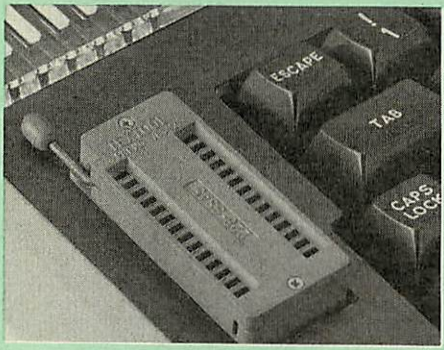
Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7
Delta-Cat A mouse eliminator Joystick for the Archimedes	£24

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 — £25

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	£11
● Spare Cartridges	£2.50
● Spare Rack	£1.50

ROM Cartridges for the BBC Master

Will accept the new larger PIggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£8**; Quad **£12**

16K DISC RAM

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

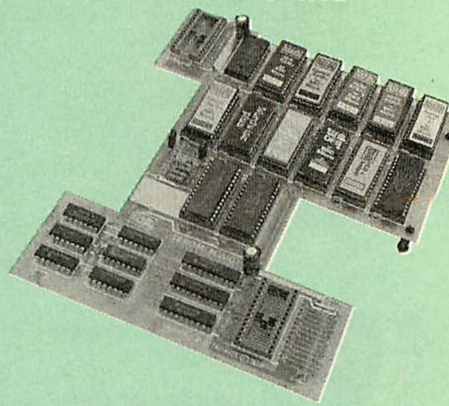
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- Supplied complete with Battery Backup.
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for profressional software development.
- Supplied with utilities software disc.

Only: **£32** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

FINANCE AVAILABLE

In these days of expensive borrowing, we are pleased to have negotiated a special low rate finance deal for our customers, with flat interest rate of 12.25% per annum, typical APR 25.5%.

In addition to the above, we are able to offer all Archimedes and BBC Master computers as well as selected hardware on a 0% interest free finance deal.

For further details please telephone: 0923 37774 ext 223/203/201.

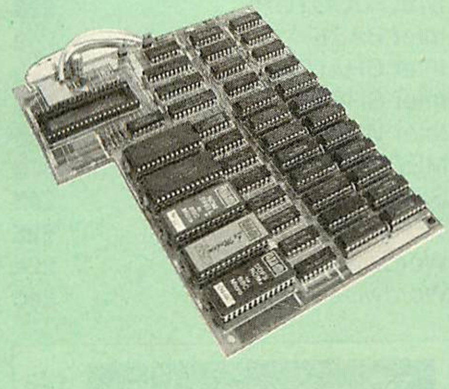
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 6 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM £48
- ROM/RAM card with 64k dynamic RAM £65
- ROM/RAM card with a massive 128k dynamic RAM £109

(carriage on ROM-RAM Card £3)

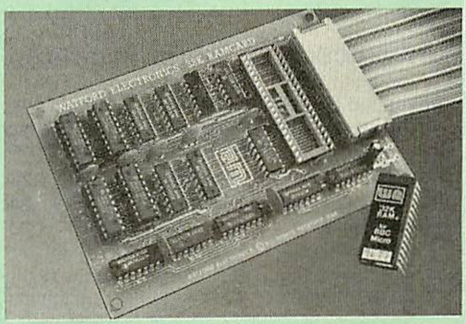
OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit £9
- 16k Dynamic RAM for Upgrade £13
- Battery backup £3
- Read and Write protect switches ....£2 each

Complete ROM-RAM board
All options installed £115

P.S.
IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K
SHADOW RAM-Printer Buffer
Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.

- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)
(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32k SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (Carr £3)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

Special Offer **£18**

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs £11.25
- Maths with a Story 2 (Disc). 4 further maths programs. £11.25
- Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs. £17.00
- RELATIONSHIP: Science (Disc) O-Level Biology program. £20.00
- BONDING: Science (Disc) O-Level Chemistry program. £20.00
- ELECTROMAGNETIC SPECTRUM (8 Discs) O-Level program. £20.00
- ELECTRONICS IN ACTION (Disc) O-Level program. £19.95
- NEWTON & THE SPACE SHUTTLE (Disc) O-Level program. £20.00
- ECOLOGY (Disc) O-Level program. £20.00
- POLYMERS (Disc) O-Level program. £20.00
- Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. £20.00
- FOOD & POPULATION (Disc) O-Level program. £20.00
- MICROTECHNOLOGY (Cassette) O-Level program. £11.25
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. £21.70
- DEUTSCH DIREKT! (Disc & Audio Cassette) £19.95
- Modem Master (Disc) £11.25
- ADVANCED TELETEXT SYSTEM £8.65
- PERIOD TABLE SOFTWARE £20.00
- Astronomy – Primary (Disc) £12.00
- Computers at Work – Primary £17.35
- Introducing Geography – Primary £17.00
- Introducing Geography 11-17 years £17.50
- Electric Fields 6-14 years £11.25
- Black Queen Contract Bridge £13.00
- Espana Viva – 3 Discs £19.95
- A Vous La France Disc £21.50

Educational Software

FUN SCHOOL 2 – Red:
Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic.

FUN SCHOOL 2 – Green:
6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump £11.00

FUN SCHOOL 2 – Blue:
Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. £11.25

Versatile BEEB SPEECH SYNTHESISER Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £3)

Continued→ → → → → → → → → →

VIEW 3.0 ROM £45

VIEW PROFESSIONAL £50

VIEWSHEET (Acornsoft) £36

VIEWSTORE £36

VIEWSPELL with 80 track disc £29

VIEWPLOT Disc £20
(Please specify for Master 128 or Compact)

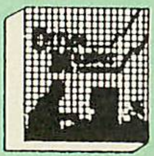
VIEW-INDEX £12

OVERVIEW packs 1 & 2 £65

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc) £8
Juki & Brother HR15 (Disc) £8

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.
FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.
MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.
EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.
INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.
STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.
SPREADSHEET – Offers many calculation and editing features
BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

MINI OFFICE II

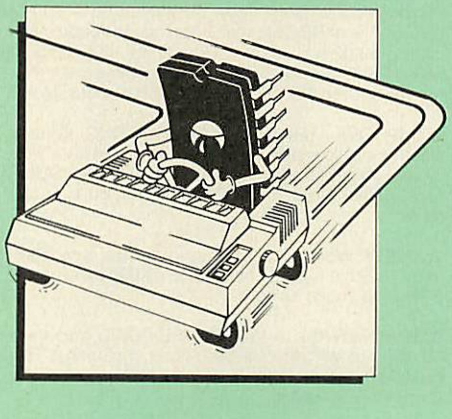
DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.00
DISC Version for the Compact	£18.00

(When ordering please specify for which Micro & 40 or 80 track Disc)

Advanced Computer Products

Advanced Disc Toolkit	£28
Advanced Disc Investigator	£24
Advanced 1770 DFS BBC	£27
Advanced 1770 DFS Master	£28
Advanced File Manager	£24
Advanced Control Panel	£28

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find thomselves in the realms of advanced word processing at only a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

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Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

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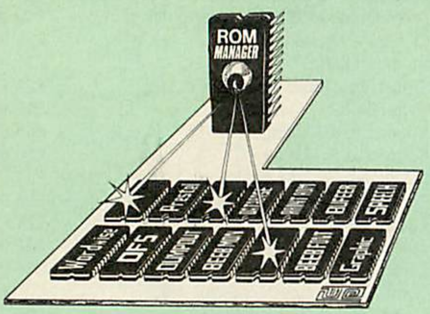
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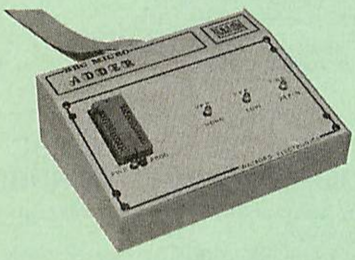
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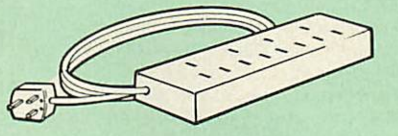
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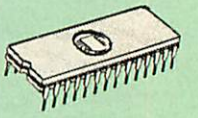
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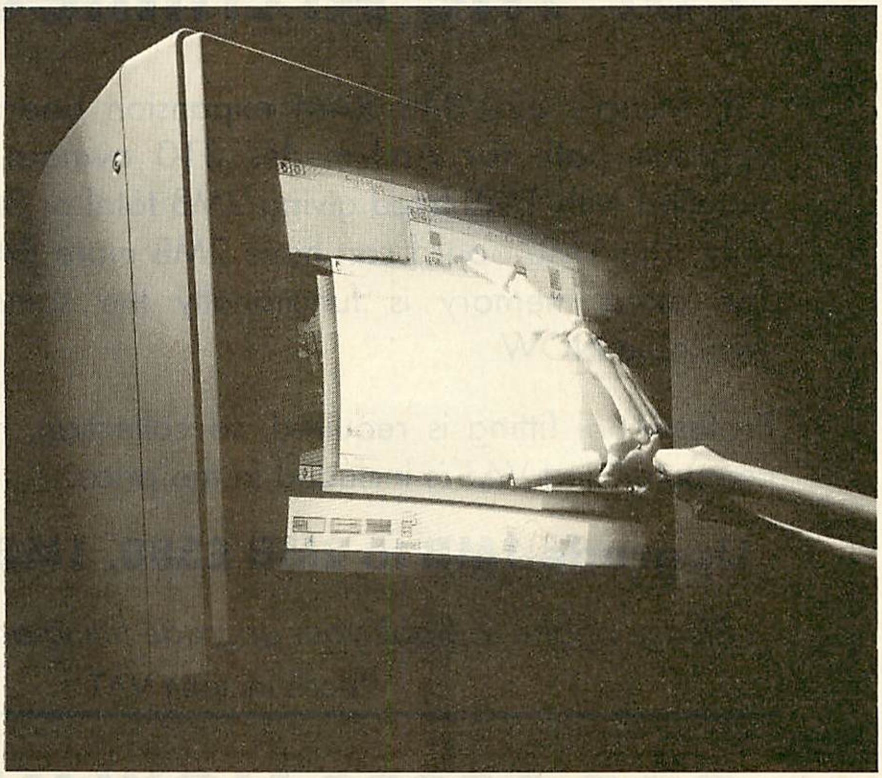
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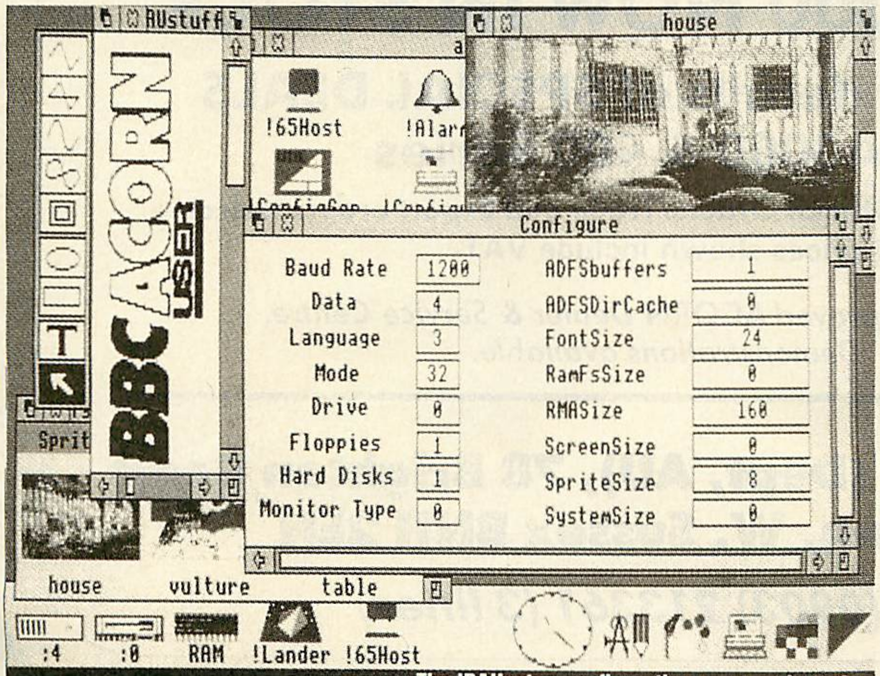
Writing Risc OS programs is a tricky business but things are made a lot simpler with this Wimp skeleton program from **JASON O'BROIN**



One of the nice features of BBC micro programming is the ability to run off a quick program without having to worry about conforming to any set of rules. Things have changed now that the Archimedes is on the scene. The philosophy behind Risc OS is that virtually all programs should adhere to a standard user interface, namely the desktop.

This is fine but now you can no longer just dip into a bit of programming – the routines needed to handle the desktop have to be written as well. What is required perhaps is a 'shell' – the skeleton of an application around which you can wrap your own program.

This article describes what is involved in writing programs which work under the desktop and also provides such a shell for writing Risc OS applications. As an example, I have written a configuration program around my shell to demonstrate the principles involved. This will allow you to configure some of the settings that Acorn's version doesn't but which I consider useful. To avoid confusion, this new configuration program is called *!BAUsetup*.



The !BAUsetup configuration program in action

Basics

All the files necessary for a program to work under Risc OS must reside in a directory named !Progname (in the case of the example it's !BAUsetup). The ! tells the operating system that this directory is actually an application. The directory should contain at least a !Run file, a !RunImage file and a !Sprites file. The !Run file is executed when the user double-clicks on the application and should terminate by running !Runimage. !Run must be an obey file.

A Risc OS program should be written so that its application directory can reside anywhere on the disc. Absolute pathnames (like adfs::4.$.!BAUsetup) must not be used.

At the time the !Run file is executed, the operating system variable obey$dir contains the pathname of your application, so the !Run file should assign its own variable to contain this value and use this when subsequently accessing files in the directory. In our example !Run file this is achieved with the command:

```
set BAUsetup$dir <obey$dir>
```

The < and > signs are used to set BAUsetup$dir to the string contained in obey$dir at the time of execution and not to the current value of obey$dir. The command Wimpslot is used to select the maximum and minimum amounts of memory the program can use, and then <BAUsetup$dir>.!RunImage runs the main program.

The !Sprites file contains the large and small mode 12 sprites, of maximum size 40 by 18 and 19 by 9, called !progname and sm!progname (in this case !bausetup and sm!bausetup). One of these sprites is displayed when the parent directory is catalogued by the user.

To try out the example, create a directory called !BAUsetup. Copy the sprite file !Sprites from the !Configure directory on the Applications disc 1 into !BAUsetup. (You will need to open the !Configure directory by double clicking on the icon with SHIFT held down – otherwise you will just install *!Configure*).

Then, using *!Paint*, rename the two sprites from !configure and sm!configure to !bausetup and sm!bausetup respectively, and then resave the sprite file. Now run listing 1 on the yellow pages to generate the file Templates. (Listing 1 comes from last December's *Arc Agora* – refer to page 30 of that issue for more details.)

The next step is to create the !Run file. The best way to do this is to use *!Edit*. Pressing the menu button on the *!Edit* icon gives a table of file types which documents may have. Create an obey file, type listing 2 into the editor and save it as !Run. Next create a text file, and type in listing 3. Save this text as Menu.

In theory, *BUILD could be used for both these operations but it has the side effect of trying to substitute for operating system variables, so <obey$dir> is expanded instead of being left as <obey$dir>. Stick to *!Edit*.

Finally type in listing 4, and save this file as !RunImage. Check that you have all the necessary files in !BAUsetup – there should be !Run, !RunImage, !Sprites, Menu and Templates. Return to the desktop, and having catalogued the disc, double click on the *!BAUsetup* application.

An icon will appear on the icon bar. Clicking on this icon with the menu button will cause a menu to appear, while the select (left) button will open the main window. Click with the select button on a configuration option to increment its value. Use the adjust (right) button to decrement it. The menu button creates a menu giving you a choice of loading or saving the current configuration values.

Icon bar

When loaded, Risc OS applications should remain dormant until called into action. This is achieved by the application, when loaded, stationing an icon on the icon bar at the bottom of the desktop screen.

LOCATION	DESCRIPTION
block%!0	Handle of window to create icon in (on the iconbar, use -1 for RHS and -2 for LHS)
block%!4	Relative xmin
block%!8	Relative ymin
block%!12	Relative xmax
block%!16	Relative ymax
block%!20	Icon flags. &2102 used here
block%!24	Pointer to name of sprite (max 12 characters)
block%!28	Sprite handle
block%!32	Length of Sprite name

```
Entry: R1 = Pointer to data block
Exit : R0 = Icon handle (unique to window)
```

Table 1

```
Entry: R1 = Pointer to buffer for Template
       R2 = Pointer to indirected icons' workspace
       R3 = Pointer to end of workspace
       R4 = font reference - beyond scope of this
            article, so use -1 to indicate no fonts
       R5 = Template name (can include wildcards)
       R6 = Position to search from (0 for start
            of file)

Exit:  R1 = Template. Use SYS Wimp_CreateWindow to
            create, with R1 pointing to this block
       R2 = Remaining workspace
       R5 = Overwritten with actual name, so 12
            bytes must be available
       R6 = Position of next entry (0 if no match)
```

Table 2

CODE	REASON
0	Null
1	Redraw Window
2	Open Window
3	Close Window
4	Pointer Leaving Window
5	Pointer Entering Window
6	Mouse Click
7	User Drag Box
8	Key Pressed
9	Menu Selection
10	Scroll Request
11	Lose Caret
12	Gain Caret
13..16	Reserved
17	User Message
18	User Message Recorded
19	User Message Acknowledge

```
Entry R0 = mask     R1 = Pointer to block
                         for return data
Exit  R0 = reason   R1 = Pointer to block
```

The code returned is also the bit number of the mask so to mask out the open and close window reason codes, a mask of 4+8 (12) is used. Do not set bits 1, 2, 3, 6, 8, 13-16, 20-31

Table 3

Clicking on this icon with the select button will notify the application to open its main window, while selection with the menu button should pop up a menu of options. To install an icon, FNiconbar(spname$) is used. This uses the Wimp_CreateIcon SYS call, with R1 pointing to a data block. The format of this block is described in table 1.

Icons on the icon bar must adhere to rules of size and position. The icon must be defined in mode 12 and should occupy 68 by 68 os-units (as used by *!Paint*), situated at 0,0. (Other icon formats do exist, in particular one with both icon and text: these are detailed in the new *Programmers' Reference Manual*). This 68 by 68 square is relative to the bottom left corner of the icon's designated position on the icon bar. The horizontal position is determined by the Wimp system, but the height is supplied by the program.

The menu of options should contain a minimum of Info and Quit, and may also contain any other options deemed necessary (such as creating a new document).

Menus on the icon bar must be a fixed height above the base of the screen and should sit parallel to the top of the icons. This is calculated by knowing that the height of the bottom of the menu is 96 os-units and that each menu item takes up 44 units with a dotted line between items taking up 24 units.

Windows and templates

Creating windows in Basic is a pain! To do this you have to build up a large data block specifying the parameters for the window and then any icons inside the window, together with their parameters.

Fortunately there is an Acorn public domain utility called *!FormEd* which lets you design any number of windows on screen. Finished designs are usually saved as a file called Templates in the application directory and the format of the window definitions is basically the same as that required by Wimp_CreateWindow – which is the SYS call that actually brings windows into existence.

So, all that is necessary is to open the template file with SYS "Wimp_OpenTemplate". Then the required window is searched for by name with SYS "Wimp_LoadTemplate". (Table 2 has details of this call). Once found, it is loaded into a specified data block, and the window can be created using SYS "Wimp_CreateWindow".

The data block for Wimp_LoadTemplate must be big enough for the window, all icons and all indirected data (the indirected data is first loaded into the block and then copied into the indirected data area).

!FormEd is an unsupported application from Acorn and may be obtained either by writing to Acorn direct or by downloading it from SID (Tel: (0223) 243642) or from one of the other Archimedes Bulletin Boards. *!FormEd* is also included on this month's 3.5in disc.

I would recommend anyone thinking of writing Risc OS applications obtains a copy of this, and uses it!

Polling day

In the past, what operations a program performed (and the order in which it performed them) was largely determined by the programmer.

Risc OS programming means that the user is now in charge of the program flow. The user is free to choose options, resize windows, display different sections and so

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on whenever he or she wishes and the program must respond accordingly.

As a result, when a program is run and has set itself up, it should wait in a loop until the user causes something to happen. This is achieved through the Wimp_Poll SYS call. When this call is made, the operating system takes over and only passes control back to the program when something has happened that it thinks the program should know about.

In this way, multi-tasking is achieved, as all the programs running in the machine get a chance to function whenever something happens that effects them, or when nothing is happening. Hence, any program being used by the user gets higher priority than the rest. Polling is achieved by:

```
SYS "Wimp_Poll",mask,block TO reason
```

As table 3 shows, mask can be used to ignore any reason codes the program doesn't recognise or doesn't want to service, to make the system run as fast as possible. However, unknown reason codes should not be masked out and some others cannot be disabled.

The memory at block is used to return any data that the program may need to know about and reason contains the reason code for what has happened.

Most programs will need to service the open window and close window requests, the mouse button change and the menu select reason codes. Some of the requests (like open and close window) demand action while others (like pointer leaving and entering window) are really only for information, should the program wish to take any special action (like changing the pointer shape).

When Wimp_Poll returns, PROCpoll calls PROCaction with the reason code, which in turn calls the appropriate routine, determined using a CASE... ENDCASE structure. This makes it very easy to slip new servicing routines in.

Menus

In my example I have provided a standard menu subsystem. All that is required is to create a text file defining the menu structure, dimension some variables and write the necessary subroutines. Then, having called the routine to create a menu, no other programming is needed. All the information to act upon the user choice is already provided.

The menu file is loaded from disc and when you specify a particular menu, this is found in the list. A data structure suitable for the Wimp system is built up and finally a Wimp_CreateMenu call is made using this data structure. This creates and displays the menu.

When the user clicks on a menu item (using the left-hand button), reason code 6



Wrap your own program around a skeleton

```
A ^ indicates a new menu and so Title must be
followed by address of memory block for this menu

Menu option may be preceded by (in this order):
}       Tick this option
#       Writable field

Menu option may be followed by (in this order):
@       Points to a sub menu
}       Dotted line after this option

Following the menu option may be the following
fields (in this order):

!       Pointer to sub menu or window or writable
        buffer (If the field is writable then the
        format is: address of memory, block,
        validation, length of block )

{       Value for Wimp Flags (by default &7000021)
\       Function name to call if option selected

A ~ marks the end of all the menu structures, so ~
or ^ is be considered to be the end of a menu.
```

Table 4

is returned (menu select) from Wimp_Poll. The location in R1 contains a list with the item number of each display menu (-1 marking the end).

So, if an item was chosen from a submenu, the first word would contain the number of the submenu in the main menu list (starting from 0) and the second word would contain the item number of the selected option. Using the menu structure, the appropriate routine is called.

To create a menu, PROCbuild_menu is called, specifying the required menu. This menu title is searched for in the data block (all the menu data must be loaded into a memory block called menu_data%).

The variable immediately after the title is the memory block to be used for the menu definition which is passed to the Wimp system.

The procedure then takes all the subsequent menu items in turn until it reaches the next menu title marker or the end of data marker, and extracts the relevant data for the menu block. This may consist of flags for the menu items, pointers to other windows or submenus, and one or two other features. If a pointer to another submenu is set up, PROCbuild_menu is called to create this submenu and return the location of the data block to be stored in the menu's data block. See table 4 for details of the menu file format.

When all the items have been set up, the variable current_menu$ is set to the name of this menu. As only one menu can be open at a time (discounting submenus), the program knows which menu is open so it can correctly work out what to do when a menu option is chosen.

When a menu option is chosen, its identity is obtained by a recursive search. When the correct item is found in the menu data, a line prefixed by \ contains a function to call if this menu item is chosen. This must be a function name, as EVAL is used to call the function (a=EVAL("FN"+func$)). If this (optional) field does not exist, then no action is taken. This makes it easy to add in new functions without leaving loose ends.

Most of the time, menu items are selected using the select button. If you select a menu item using the adjust button though, the current selected menu and submenus should remain on screen.

It is then the onus of the program to make sure it calls Wimp_CreateMenu, updating the menu tree as necessary, before the next call to Wimp_Poll).

The operating system, seeing that the same menu has been opened, will update the menu and will also attempt to keep all the submenus open. This is achieved by using Wimp_GetPointerInfo to read the status of the mouse buttons (before acting on the menu option) and, if the adjust button was pressed, PROCre_openmenu is called to keep the menu on screen. This procedure is also useful for opening menus which have already been defined once.

Using PROCbuild_menu, the menu data is read out of the menu data block. Writable fields are therefore set back to their default settings. If you want these fields to keep the values the user types in, then PROCre_openmenu can be used instead (although you will need to keep a track of the menu height if it's on the menu bar).

And finally...

This article has covered many of the areas necessary to write Risc OS programs. Obviously there is much more that Risc OS (and in particular, the Wimp system) is capable of, but the code contained in *!BAUsetup* should act as a good starting point and indeed, contains the code common to all Risc OS programs.

To create your own Risc OS programs, *!BAUsetup* version of !Runimage (listing 4) can be used as a starting point, changing references to 'BAUsetup' and so on, and by removing the *!BAUsetup* specific routines such as PROCget_cmos.

In the future we intend all Risc OS programs published in *BBC Acorn User* to conform, where possible, to this format. Readers who wish to submit programs to the magazine are, therefore, recommended to make use of this article and the accompanying programs.



This is the second part of the 1989/90 *BBC Acorn User* Awards. All that is best in the Acorn world is recognised here

BBC ACORN USER 1989/90 AWARDS

Last month the best software awards in eight categories for both 8-bit micros and 32-bit machines were awarded. This month it is the turn of the hardware to come under the spotlight.The bad news is that the award for Best Music add-on for the 32-bit category has not been given. After much discussion the judges have decided that MIDI interfaces and the innumerable good but similar samplers do not measure up to the award and so it has been withdrawn. Better luck next year perhaps... This month also sees the general awards and we start off with them.

BEST ADVERTISEMENT

SCAN LIGHT COMPUTER CONCEPTS



Choosing the best advert in a year's worth of *BBC Acorn User* is not an easy task. However, Computer Concept's double page spread for the Scan-Light scanner and (as yet unreleased) fax card pips the others at the post.



This is a very clever use of one colour page and one black and white. The design makes this otherwise awkward fact nearly invisible.

What's more it looks good and sells the product well. What more can you ask!

Runners up

A close second is Acorn's own advert for the A3000. Made up of windows, and illustrating all the main attractions of the A3000, it's only a shame it couldn't have been an actual screen.

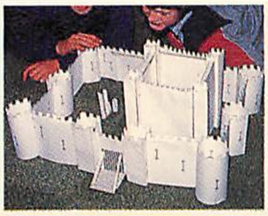
Also worth a mention is Computer Concept's economy drive – the *Impression* ad which combines six full page ads onto one page. Panasonic's printers-in-bed ad has 14 review quotes, eight of which are from Redwood Publishing staff.

Integrex would get the award for longevity (if there was one). The Colourjet ad has been exactly the same for as long as anyone can remember (except the price – which has gone up, of course).

Finally, Superior Software gets the 'Modesty in our time' booby prize for the famous cover-up of Maria Whittaker in the *BAU* versions of the *Barbarian* and *Barbarian 2* ads (full marks if you spotted them slip through in the *Play It Again Sam* ads in the December issue).

MOST INNOVATIVE SOFTWARE

8-BIT DESIGNER CASTLES DATA DESIGN



Designer Castles must rate as one of the most original uses of a home computer ever. Many companies have produced Cad packages but one that actually prints the pieces so that you can construct your own design is really novel.

Based around a Wimp environment, *Designer Castles* provides a number of castle sections which can be linked together to construct anything from the smallest battlement right up to your very own Tower of London. Towers, turrets, drawbridges and portcullises are all included.

Pieces are dragged from a menu into the main design area and a continuous front elevation is displayed so you can see what to expect from your design.

Once the castle has been designed, the plan and elevation can be printed with the construction later. The whole castle can then be printed out in a number of sizes.

The clever part of *Designer Castles* is that it produces the actual pieces required for the model. Sections are printed out as outlines with tabs to join them together.

Aimed at the education market, *Designer Castles* is extensive in its uses. It could be used for anything from history to art lessons and at only £35 it is excellent value for money.

Runners up

The other outstanding bit of software innovation for the Beeb must be the whole AMX mouse concept. However, despite its success and the success of further AMX products, AMS sadly joined the ranks of defunct Acorn-related companies a year ago although the products are still produced by Watford Electronics.

32-BIT RISC OS ACORN



What is now the most famous and widely used piece of software written for the Archimedes is surely also the most innovative – Risc OS. Written as the successor to Arthur, Risc OS provides a desktop environment in which programs can multi-task.

The applications supplied with Risc OS are equally pioneering and make good use of its new features. In particular, *!Draw* is an excellent object orientated drawing program that allows users to use bezier curves.

!Paint and *!Edit* are also outstanding products in their areas.

The main power of Risc OS is its ability to have more than one program running at a time. The majority of new software written for the Archimedes has been written to comply with this facility and it is now possible to have any combination of programs running together.

Data can easily be transferred from one to the other (if applicable) by simply dragging the relevant item across.

Over the next few years Risc OS is likely to be further enhanced, pushing the power of the Archimedes to its limit. Even in its present state though, it wins hands down over operating sytems found on more expensive machines such as the Apple Macintosh.

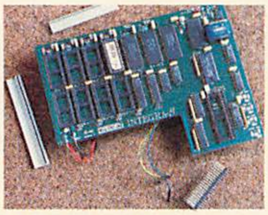
Runners up

Perhaps not the first thought of many, but innovative nonetheless, is *Zarch*.

Like the first programs on the BBC micro, *Zarch* is still regarded as a classic amongst games. Its fast solid 3D graphics set a whole new standard in computer entertainment, carrying on from where lesser micros fear to tread.

MOST INNOVATIVE HARDWARE

8-BIT INTEGRA-B COMPUTECH



Extra Ram for the BBC model B has been around in various guises, almost as long as the machine itself. The Integra B board from Computech takes all the best add-ons and puts them on a single circuit board to fit inside the Beeb.

The board provides 20K of shadow Ram, 64K of sideways Ram and eight Rom sockets. These will accept 8K, 16K or 32K Roms or extra Ram. Software to drive all three is included in Rom.

There's even 12K of private Ram to emulate that found in the Master 128 and this can store the machine configuration when power is off. A real-time clock is also provided.

Software compatibility is extremely good. The major packages such as the *View* family and *AMX Stop Press* will work as if in a Master, making use of shadow and sideways Ram where appropriate.

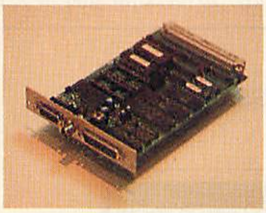
At £135, the Integra-B board is relatively expensive, considering you're not getting the applications (*View*, *Viewsheet* and so on) found in the Master 128. It does however provide a single one-off upgrade, avoiding the headaches of Rom/Ram board clashes. For that alone, it more than justifies its above average price.

Runners up

Genuine innovation is hard to define but the Hybrid Music 5000 certainly exhibits many innovative qualities to provide unrivalled sound quality from a micro add-on.

Innovative in a different way is the PMF bar code reader for the Beeb. These days when even a lot of magazines have bar codes, the PMF model remains the simplest and cheapest.

32-BIT MULTIPOD BRAIN SOFTWARE



The Archimedes and A3000 are innovative products in their own right. Choosing the add-on for this prize was not easy but it goes to Brainsoft's multiple I/O podule.

The range of functions it performs and the way it has been designed and built is revolutionary. One of the main advantages of the board is the cost per function. Video and sound digitising, a serial interface, an analogue port and Rom/Ram sockets are all included on one £135 single-width podule. Pictures can be digitised in any graphics mode supported by Risc OS and sound sampled in either mono or stereo at up to 64KHz.

A separate communications program allows the Arc to act as a terminal for a wide range of computers. The Rom/Ram sockets will accept most devices, including 'legal' BBC B Roms which can then be used under the 6502 emulator. The analogue port will also work under the emulator using the ADVAL command.

The amount of circuitry needed for the podule is considerable and Brainsoft has crammed it all in using some surface-mounted components – itself an innovation for third party add-ons.

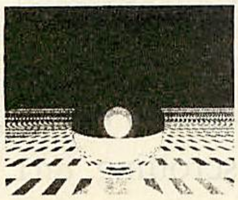
But the heart of the podule is the analogue-to-digital converter and this is uniquely realised in a single semi-custom chip especially designed for the Multipod by Brainsoft.

Runners up

Perhaps the other most innovative product for 32-bit Acorn machines is the Arm3 upgrade from Aleph One. Although the innovation is not from Aleph One, this chip will see Acorn micros break yet more records for speed and performance.

BEST ARTICLE

BALL OF MIRRORS RICHARD BROWNING



This was a difficult choice. Almost every reader has a different idea of the best article or program which has appeared in *BBC Acorn User* in the past year. However, just tipping the scales was Richard Browning's excellent ray tracing program.

Ray tracing is a technique for producing pictures on a micro by calculating the path of 'each' ray of light hitting the scene. Ray tracing is usually associated with immensely powerful computers producing broadcast graphics.

More recently, ray tracing has come down to personal computers and Clares' *Render Bender* package brought the technique to the Arc.

The *BAU* program is unbelievably short – only 96 lines of Basic in all. Although it is not a complete *Render Bender* clone, it proved how complex graphical displays can be achieved on Acorn micros.

In fact, the program works on any Acorn machine – even the modest Electron could run this program (albeit rather slowly).

Richard's program produces a picture of a shiny globe above a 'tartan' table with all the shadows and reflections in place.

If you haven't seen Richard's ray tracing program in operation on your micro, look out the May 1989 issue now and start typing! Also look out for an even more impressive ray tracing program from Richard in the next few issues of *BAU*.

Runners up

The other main contenders for the title were Andrew Rankin's collidng galaxies simulator from the July issue and Dave Lawrence's random faulted landscape generator in the September issue of *BAU*.

MUSIC ADD-ON

8-BIT MUSIC SYSTEM HYBRID TECHNOLOGY



The Hybrid Music System first saw the light of day in 1984 as the Acorn Music 500. It was later relaunched by Hybrid Technology (the original designers) as the Music 5000 and a host of extra 000s were added on.

Based around an extremely fast digital-to-analogue converter (effectively a sound sampler in reverse), the Music 5000 produces sounds with up to eight stereo voices and with another eight possible with the addition of the Music 3000 expander.

The Music 5000 uses a specially written language called Ample to generate the music. This is effectively a multi-tasking music operating system and composition language. A more user-friendly (for musicians, anyway) front end allows music to be typed onto staves or the Music 4000 keyboard can be used to enter notes in a more conventional way. The mixing desk gives real-time editing of any pre-programmed composition.

Once created, music can be played back in a number of ways. Output is provided as a 5-pin DIN socket which can in turn be connected to any suitable amplifier.

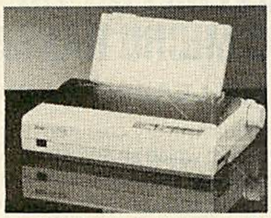
A separate amplifier (the Music 1000) enables you to listen to your composition through headphones or speakers. Finally, music can be played as a MIDI signal by adding the Music 2000.

Runners up

There is no other sound generating hardware for the Beeb. The only other hardware offered in this area is MIDI interfaces. The most famous of these come from EMR and UMI. Both are available with sequencing software.

BEST PRINTER

8-BIT LC-10 II STAR



It is difficult to split the printer awards between 8-bit and 32-bit micros but on the assumption that Beeb owners want cheaper machines, the Star LC-10 II walks away with the 8-bit award. The LC-10 II is a 9-pin dot-matrix printer, upgraded from the older LC-10 and it offers remarkable performance for just £230.

Both friction and push tractor feeds are provided and cut sheet paper is loaded automatically. The quality of print is excellent. Many 24-pin printers would be proud of the NLQ.

Unusually for such a cheap machine, the LC-10 II offers a choice of four different NLQ fonts. It is fast too, as fast as some 24-pin machines costing over £100 more.

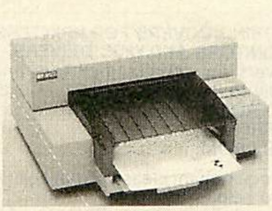
The LC-10 II can emulate both Epson LX machines and the IBM Proprinter giving it a wide range of printing effects and it can even produce quadruple height letters nearly 0.5in high. The LC-10 II shows there is still plenty of life left in 9-pin printers with a performance to take on 24-pin models but at a bargain price.

Runners up

Several other 9-pin models offer lesser performance for an even cheaper price. The Panasonic KX-P1180 and the Mannesmann Tally MT-81 in particular offer good value.

Beeb users and thrifty Arc owners can pick up a 24-pin printer for a good price too. The Panasonic KX-P1124, the NEC P2200 and the Citizen Swift 24 all offer excellent performance at a low price.

32-BIT DESKJET PLUS HEWLETT PACKARD



An undeservedly low profile printer, the Deskjet Plus officially costs £795 but it can often be bought for at least £200 less and it offers all the facilities of a laser printer costing twice as much.

The Deskjet is a 'bubble jet' printer. It is equivalent to a 56-pin dot-matrix machine and produces superb print of both text and graphics. There are two text qualities – draft and NLQ. Both qualities are significantly better than the majority of 24-pin NLQ prints.

Although it's not as fast as a laser printer the Deskjet is nevertheless much speedier than most dot-matrix machines. It can whip off a page of NLQ in about 20 seconds.

A range of print sizes are provided and other sizes and styles are available on cartridge. Hewlett Packard's LaserJet type control codes are used but Epson FX emulation can also be added.

The Deskjet handles paper just like a laser printer too. Only cut sheet paper is used and this is fed automatically from a paper bin. The paper feed can even cope with envelopes.

As a laser printer substitute for half the price there's nothing to touch it.

Runners up

There are many other printers, mostly 24-pin machines, which are well worth considering for an Arc, A3000 or even a spoilt Beeb. For all-round good performance, the NEC P6 Plus and Epson LQ-850 offer tried and tested designs. You can't go far wrong with these.

In the mid-price range the Citizen HQP-40 stands out and at the cheaper end of the scale, the Epson LQ-500, Panasonic KX-P1124 and (particularly) the Citizen Swift 24 all offer remarkable performance for a reasonable price.

BEST MODEM

8-BIT NIGHTINGALE PACE MICRO TECHNOLOGY



One of the oldest manually operated modems is the winner in the 8-bit category. The Pace Nightingale is sadly no longer made but it is readily available second-hand. It is a v.21/v.23 (300/300, 1200/75 baud) modem which can also operate at 75/1200 baud (reverse Prestel).

This feature has made it popular among bulletin board operators as callers can connect at the same speeds they would to commercial services such as Prestel.

Although 300/300 baud is old hat by today's standards, communicating at 1200/75 is still popular and the majority of Beeb based boards operate at this speed.

Another contributing factor to the Nightingale's success is reliability. The unit can be left on for hours on end without overheating or malfunctioning in any way – unlike several of its successors – so second-hand purchase is a viable option.

Runners up

The gap between manual and intelligent modems was bridged with the Designer modem from Modem Marketing.

A v.21/v.23 type modem, it was designed with the Beeb in mind. Suitable software such as the *Zromm* or the *Command* Rom can be used to set the speed and data format as well as dial and answer. Even without these additional packages, the Designer has an auto-baud detect facility which saves the user the trouble of setting the baud rate of the host system they wish to dial.

Complete manual operation is also provided and the unit even includes a speaker so the user can listen in on the status of the phone line.

32-BIT HI-TEC EC2400 MODEM MARKETING



The Hi-Tec EC2400 (also sold as the Demon IV and Pro 4) represents the very latest in modem technology at a price you can afford.

Besides being an intelligent v.22bis (2400/2400 baud) Hayes compatible modem, the EC2400 also features Microcom Network Protocol (MNP) error correction and data compression to level five. Data is compressed prior to transmission so even though the modem operates at 2400 baud the effective data throughput can reach 4800 baud.

The EC2400 features a battery backed memory (a good thing as there are numerous internal settings) and common command strings including phone numbers can be stored.

The EC2400 is the state of the art in modems and goes well with the Arc.

Runners up

Still popular are the first affordable Hayes compatible modems for Acorn users – Pace Micro Technology's Linnet range. The Linnet can be purchased as the Micronet and Microlink multi-speed modems.

The Linnet range of modems are easy to use, yet very powerful. Hayes commands enable the user to control all the functions of the modem from the terminal software using the infamous AT commands rather than press buttons or flick switches.

The ease of use is one of the modem's major attractions. Even though the range of facilities offered is greater than manual counterparts, beginners find that after a short while, operating the modem is just as easy as using a manual model.

BEST DIGITISER SCANNER

8-BIT BEEBSCAN WATFORD ELECTRONICS



The Watford Beebscan shows just how much can still be done with a humble BBC micro, and how cheap a scanner can be – the package costs just £155 for both the hardware and software.

The Beebscan consists of a hand-held A5-width scanner, an interface box and control software in Rom. It plugs into the 1MHz bus and the Beeb's auxiliary power supply. Control is just a matter of issuing a *SCAN command and then rolling the scanner down the artwork.

A thumbwheel on the scanner controls the overall darkness of the image. The picture appears as a mode 0 image with a choice of dithering patterns to give 16 pseudo-grey levels and the results are surprisingly professional.

Images can be loaded into an art package for retouching, although this must support mode 0 graphics.

Alternatively, pictures can be scanned directly into Watford's own *Wapping Editor* DTP software.

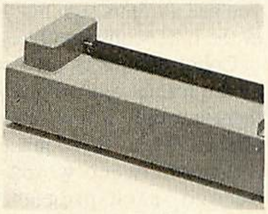
Runners up

There are no other scanners for the BBC micro and Master, and the only video digitiser available is also from Watford Electronics.

The well-established Beeb Video Digitiser, which costs a reasonable £125, operates with the BBC model B, B+ and Master 128 micros and can easily 'grab' an image from any composite video source (a camera or videotape) and reproduce the result in mode 0, 1 or 2.

Eight grey scales (on a monochrome monitor) in mode 2 give a surprisingly clear picture considering the limitations of the Beeb's display.

32-BIT I-SCAN IRLAM ENTERPRISES



A host of scanners are available for the Archimedes, from A5 hand-held scanners to a motor-driven A4 machine.

The I-Scan is the most expensive at £680 although the quality of the hardware and software far exceeds anything else on the market.

The scanner itself is housed in a solid metal case which includes the scan head and motor drive. There is just one interface socket as all control is provided through the software. 'Upgrading' is just a simple matter of using new software. Power is provided from an external mains converter.

The resolution is either 100 or 200dpi. Both resolutions use 16 true grey-scales – this is far better than any of the other scanners. A software contrast control allows all sorts of pictures to be scanned, ranging from dark photos to light pencil sketches.

The scan quality is excellent and will be further enhanced by an 800dpi resolution mode (monochrome) with add-on software available in the future.

Runners up

The other Arc scanners come a close second. With lower resolution models available from Beebug, Technomatic and Watford Electronics, there is a wide choice of cheaper alternatives.

Also hot on the heels of Irlam Enterprises' I-Scan is the Watford Electronics Archimedes Video Digitiser.

This digitiser is designed for 'real-time' video processing and will grab a composite video signal at up to 25 frames per second. Sixty-four grey level images are possible with a monochrome monitor and colour screens can be grabbed using red, green and blue gels.

DOWN TO

Not so long ago a Cobol compiler on anything less than a minicomputer

Many readers will have heard of the programming language Cobol. However, most will have had little or no experience of it. This is because full implementations of Cobol require a huge amount of memory to run and only recently, when PCs began to increase their memory capacity, could Cobol move from its traditional home of mainframes and minicomputers. Now it has moved to the Beeb!

Cobol is a high-level computer language used for commercial applications programs. The version of Cobol described here is designed for use with the *BAU* Small Cobol Compiler package spread over this and next month's issues.

It is a simple yet quite powerful implementation. This is my own version which is not based on any particular standard and, being quite simple, it should adhere to the latest standards.

Later on I'll explain how to use the package and next month I'll show you how to implement a compiler of your own. But first a little history.

Back in the days before the Beeb, in a time when there was only one widespread programming language (Fortran), a meeting in April 1959 at the University of Pennsylvania Computing Centre in Philadelphia was held to consider establishing a common commercial programming language.

The conclusions were that such a language would improve the efficient use of computers by enabling business applications to be developed and maintained with a minimum of effort.

Programs would be 'self-documenting' and would be able to be read and written by relatively inexperienced personnel.

The specifications of this language were drawn up by the US Department of Defense – at the time one of the biggest users of computers.

In May 1959 a meeting at the Pentagon in Washington embodied the organisation in the Conference on Data Systems Languages (Codasyl).

In 1960, the first specification of Cobol (COmmon Business Oriented Language) was produced and the world's most popular commercial programming language to date was born. Since then, Cobol has become extremely popular. Some may say Cobol is now decreasing in popularity, and they would be correct. The popularity of Cobol as a commercial programming language has decreased from 95 per cent to 80 per cent! Indeed, it has been said that its popularity may, by the middle of the next century, fall to a mere 70 per cent!

There are two main reasons for its success. First, Cobol isn't a complicated language, in fact it can be written in a form much nearer to standard English than other high-level languages. This ease of programming means relatively inexperienced personnel and business users find it easy to learn and use.

Secondly, it is a powerful data processing language with simple yet sophisticated record handling facilities. Records are the basis of all commercial programs, whether employee records in a payroll or stock records in a factory stock control system.

The percentage penetration of Cobol shows the vast majority of commercial applications are written in this language. The fact is that Cobol is so popular and so widespread that firms wanting programs written for them request that they are written in Cobol. They know that they can always get programmers to maintain or upgrade their software.

As Cobol is so widespread, companies are reluctant to use newer, more sophisticated languages that have a lesser following. Staff retraining would prove to be expensive and it may be difficult to find programmers of these'fashionable' languages in the future. Without Cobol's support and backup they may be left with a 'dinosaur', an obsolete package that can neither be altered or upgraded.

Cobol can be written more like standard English than other high level languages

Cobol is in this privileged position because its popularity grew in the early days of commercial programming. Nowadays firms won't get a new language because it hasn't got the backing. However, newer languages such as C and Modula 2 are becoming popular.

This article contains a fairly detailed description of Cobol but you should read some of the books listed at the end to get a really good understanding. In view of the small 32K memory of the BBC micro, a number of limitations had to be imposed. These include no arrays and only sequential access files.

1. IDENTIFICATION	21. SELECT	41. GIVING
2. ENVIRONMENT	22. PROGRAM_ID	42. PIC
3. DATA	23. AUTHOR	43. VALUE
4. PROCEDURE	24. DATE_WRITTEN	44. AT
5. CONFIGURATION	25. REMARKS	45. END
6. INPUT-OUTPUT	26. SOURCE_COMPUTER	46. FD
7. FILE	27. OBJECT_COMPUTER	47. GO
8. WORKING-STORAGE	28. FILE_CONTROL	48. IS
9. MOVE	29. ****	49. LABEL
1Ø. ADD	3Ø. ****	5Ø. RECORDS
11. SUBTRACT	31. RUN	51. ARE
12. MULTIPLY	32. STOP	52. OMITTED
13. DIVIDE	33. DIVISION	53. KEYBOARD
14. DISPLAY	34. SECTION	54. IF
15. OPEN	35. DISK	55. EQUAL
16. CLOSE	36. BBC_MICRO	56. GREATER
17. INPUT	37. ASSIGN	57. SMALLER
18. OUTPUT	38. TO	58. THEN
19. READ	39. BY	
2Ø. WRITE	4Ø. FROM	

**** : Not used (can be used for expansion)

Table 1. The Cobol keywords

Reserved words

Cobol has many keywords, all are reserved words and so must not be used as variables. Table 1 lists the keywords. Some are two words joined together with an underline character. It doesn't matter if you use a minus sign but you must use one or the other consistently.

Cobol compilers are usually very strict on the format of a program. However, here there are only a few rules which must be obeyed. First, there must be no carriage returns between words or statements. Second, each program line must be terminated with a full stop and a carriage return immediately after the full stop. Spaces are allowed at the beginning of a line for formatting purposes (for example, in the Data Division).

All Cobol programs are divided into four parts called 'divisions', each having a specific purpose. The divisions are written

BUSINESS

would have seemed ludicrous. **JEFFREY MORGAN** proves that times have changed



in the order: Identification, Environment, Data and Procedure.

The Identification Division specifies the computer on which the program is to be compiled on, the computer on which the object code program is to be run and the peripherals to be used. In this version the source and the object computers are the same (and labelled the BBC-MICRO).

In the CONFIGURATION section, SOURCE COMPUTER defines the compiling computer, OBJECT COMPUTER defines the running computer.

In the INPUT-OUTPUT section, in FILE CONTROL, the SELECT <file> ASSIGN <DISC>/<KEYBOARD> declares which files use which peripherals. There must be at least one SELECT ASSIGN statement.

The Data Division describes to the compiler the structure of the records the program will use. It is divided up into two sections, the FILE SECTION, which contains the record structure for input and output files, and the WORKING_STORAGE area, which contains a record used by programs as an internal working area. This record follows the same format as the others.

All arithmetic constructions (ADD, SUBTRACT, MULTIPLY and DIVIDE) require that the fields they operate on are all in the working storage section. So data read in from records on disc must be moved into working storage.

The Procedure Division contains the actual instructions of the program. Figure 4 is an example of a Cobol program. It contains most if not all the statements available. The statements marked with an asterisk are compulsory.

Programming

Figure 1 lists the syntax and structure of all commands used in this version. Table 2 lists the specifications of this compiler. The data records are defined by the programmer but must follow an outline format. Figure 2 shows a typical data record. The first item FD is the file description. The item MASTER after it is the external filename of the record if it is selected as a disc file. It can be up to seven characters long. The statement, LABEL RECORDS ARE OMITTED has no effect but is a compulsory element to make programs more like standard Cobol – making transition to a full Cobol easier.

The rest of the record is comprised of the actual fields. Any data record can have up to 15 fields. Every field is made up of four parts: <level> <field name> PIC <picture> [(VALUE IS <number>/<literal>].

The keyword PIC tells the compiler a picture definition is following. Picture definitions are described later on. The VALUE IS <number>/<literal> is optional and allows a value to be assigned to a field. If not used, the field will be set to

```
KEY

<var>       - a variable (eg TOTAL)
<file>      - name of a file (eg INFO)
<word>      - a sequence of characters or a <var>
<literal> - word(s) in quotes
<picture> - picture definition (eg X(8),99)
<num>       - numeric value (eg 125,8.98)
/           - or
[]          - optional

DATA OPERATING CONSTRUCTIONS

ADD <var> TO <var> GIVING <var>
SUBTRACT <var> FROM <var> GIVING <var>
MULTIPLY <var> BY <var> GIVING <var>
DIVIDE <var> BY <var> GIVING <var>
MOVE <field> TO <field>
DISPLAY <literal> / <var>

CONDITIONAL CONSTRUCTIONS

IF <var> EQUAL TO <var> GO TO <label>
IF <var> GREATER THAN <var> GO TO <label>
IF <var> SMALLER THAN <var> GO TO <label>

FILING CONSTRUCTIONS

OPEN INPUT <file> [<file> <file> <file> <file>]
OPEN OUTPUT <file> [<file> <file> <file>]
CLOSE <file> [<file> <file> <file> <file>]
READ <file>
READ <file> AT END GO TO <label>
WRITE <file> [<file> <file> <file>]
SELECT <file> ASSIGN <DISK> / <KEYBOARD>

IDENTIFICATION CONSTRUCTIONS

PROGRAM-ID <program name>
AUTHOR <forname> <surname>
DATE-WRITTEN <date>
REMARKS <word> [<word> <word> <word>...]

RECORD DEFINITION CONSTRUCTIONS

FD <file>
<level> <var> PIC <picture> [VALUE IS <literal> / <num>]
LABEL RECORDS ARE STANDARD
```

Figure 1. Cobol programming constructions

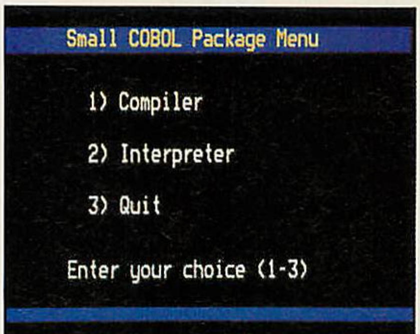
```
Ø1 GNOME.
   Ø2 CAT_NUMBER PIC X(4).
   Ø2 NAME_OF_PART PIC A(2Ø).
   Ø2 DESCRIPTION.
      Ø3 HEAD.
         Ø4 SIZE PIC 99.
         Ø4 HAT PIC 9.
      Ø3 BODY PIC A(8).
      Ø3 BEARD PIC A(3).
   Ø2 QUANTITY PIC 9(4).
```

Figure 2. A typical data record

```
Ø1 RECORD.
   Ø2 NAME.
      Ø3 FORNAME PIC X(1Ø).
      Ø3 SURNAME PIC X(1Ø).
   Ø2 AGE PIC 99.

Ø1 NEW_RECORD.
   Ø2 SAME_NAME.
      Ø3 SAME_SURNAME PIC X(1Ø).
      Ø3 SAME_FORNAME PIC X(1Ø).
   Ø2 SAME_AGE PIC 99
   Ø2 FULL_NAME PIC X(2Ø).
```

Figure 3. Data record with sub levels



Small Cobol Compiler menu

```
* IDENTIFICATION DIVISION
* PROGRAM_ID EXAMPLE
* AUTHOR JEFFREY MORGAN
* DATE_WRITTEN AUGUST_1989
* REMARKS THIS IS AN EXAMPLE PROGRAM

* ENVIRONMENT DIVISION
* CONFIGURATION SECTION
* SOURCE_COMPUTER BBC_MICRO
* OBJECT_COMPUTER BBC_MICRO
* INPUT_OUTPUT SECTION
* FILE_CONTROL
* SELECT MASTER ASSIGN DISK
  SELECT TRANS ASSIGN DISK
  SELECT BUFFER ASSIGN DISK

* DATA DIVISION
* FILE SECTION
* FD MASTER
* LABEL RECORDS ARE OMITTED
  Ø1 MASTER
     Ø2 NAME PIC X(2Ø)
     Ø2 SEX PIC X
     Ø2 AGE PIC 9(4)
     Ø2 PAY PIC 9(4)
* WORKING-STORAGE SECTION
  Ø1 PROCESS
     Ø2 PAY1 PIC 9(4)
     Ø2 HOURS1 PIC 9(2)
     Ø2 RATE1 PIC 9(4)
     Ø2 BONUS1 PIC 9(2)
     Ø2 GROSS_PAY PIC 9(4)
     Ø2 COSTS PIC 9(4) VALUE IS 25
     Ø2 UNITS PIC 9(4) VALUE IS 1Ø

* PROCEDURE DIVISION.
  DISPLAY "PROCESSING...".
  DISPLAY.
  OPEN INPUT MASTER TRANS.
  OPEN OUTPUT NEW.
  LOOP.
  READ MASTER AT END GO TO ENDING.
  READ TRANS.
  MOVE PAY TO PAY1.
  MOVE RATE TO RATE1.
  MOVE HOURS TO HOURS1.
  MOVE OVER_TIME TO OVER_TIME1.
  MOVE BONUS TO BONUS1.
  DISPLAY FORNAME SURNAME.
  MULTIPLY HOURS1 BY RATE1 GIVING GROSS_PAY.
  MULTIPLY RATE1 BY OVER_RATE GIVING RATE1.
  MULTIPLY OVER_TIME1 BY RATE1 GIVING OVER_PAY.
  ADD GROSS_PAY TO OVER_PAY GIVING GROSS_PAY.
  ADD BONUS1 TO GROSS_PAY GIVING GROSS_PAY.
  ADD PAY1 TO GROSS_PAY GIVING PAY1.
  DISPLAY "NEW PAY =" PAY1.
  MOVE NAME TO NAME2.
  MOVE PAY1 TO PAY2.
  MOVE ADDRESS TO ADDRESS2.
  MOVE DETAIL TO DETAIL2.
  DISPLAY.
  WRITE NEW.
  GO TO LOOP.
  ENDING.
  CLOSE MASTER TRANS NEW.
  DISPLAY "FINISHED.".
  DISPLAY "NEW FILE CREATED.".
* RUN STOP.
```

Figure 4. Example Cobol program

Item	Max number	Max length (characters)
Words/line	15	15
Literals	2Ø	3Ø
Labels	2Ø	14
Filenames	-	7
Records	5	8Ø
Disk files	4	-
Keyboard files	5	-
Pcode	168	-

There is a maximum of five simultaneous files.

Table 2. Specifications of the compiler

Picture	Size	Type	Comments
X(2Ø)	2Ø	Any	
XXXXXXX	7	Any	
AA	2	Alpha	
A(35)	35	Alpha	
9(4)	4	Numeric	ØØØØ to 9999
999	3	Numeric	ØØØ to 999
S9999	6	Numeric	-9999 to +9999
S99V99	6	Numeric	-99.99 to +99.99

Table 3. Examples of picture definitions

the default of null if alphanumeric or alphabetic, and zero if numeric. All file descriptions and field names must be unique. Each field has a level number (01,02,03 and so on). The level is a two-digit integer between 0 and 49. If smaller than 10 the first digit must be a 0.

Figure 3 shows a set of sublevels. The level number must increase with each new level. If more memory were available the compiler would automatically take advantage of this and would allow more than 15 fields.

Movement of data

The level of a field defines how it is to be treated when items of data are moved. Using figure 3, the following commands explain how the different levels of data are affected by the MOVE command.

```
MOVE AGE TO SAME_AGE
```

copies the value of AGE to SAME_AGE.

```
MOVE NAME TO SAME_NAME
```

copies FORNAME to SAME_FORNAME and SURNAME to SAME_SURNAME.

```
MOVE NAME TO FULL_NAME
```

copies FORNAME AND SURNAME to FULL_NAME.

Picture definitions

Each field of a record must be completely defined by a 'picture'. A picture defines the size and type of the field. There are three types of data: Alphanumeric (any character – symbolised by an X), Numeric (digits 0..9, an optional sign S and an optional decimal point V – symbolised by 9, S and V) and Alphabetic (the letters A..Z or a..z – symbolised by an A).

In a large field, when a string of the same character would occur, a shorthand notation can be used, for example, PIC 9(6) and PIC 999999 are the same, as are PIC X(10) and PIC XXXXXXXXXX.

When using a numeric data type it is not possible to specify a decimal point or a sign and still use this shorthand. For example PIC s999v99 can't be written any other way. Table 3 shows some example picture definitions.

Operating Instructions

Type in the programs as listed in the yellow pages. Because of their length, not all the listings appear this month. However, the whole thing is on the monthly disc.

Be careful with the compiler as it is very compact. Be sure to save the program under the filenames MENU, COMPILE and RUNTIME as appropriate.

Keep all package programs on the same disc since they all co-exist. All source code and object code programs to be compiled and run have to be on this disc too. This doesn't cause a problem because Cobol files will be short and so there will be plenty of disc and catalogue space.



Beeb owners can now enjoy using Cobol

Loading the package

To get the package up and running it makes life easier to SHIFT-BREAK into it, so create a !BOOT file as follows:

```
*BUILD !BOOT
0001 *BASIC
0002 CHAIN "!MENU"
ESCAPE
*OPT 4,3
```

The package is very simple to use and there are few instructions. The main menu enables you to choose the compiler, the run-time interpreter or to quit. All you have to do is simply press the number corresponding to the required option.

Each time the menu is run it tests the disc for the presence of the compiler's datafile, CDATA. If not there, it is created. This happens because, if the package is moved to a new disc, it will need to be created. This file contains the keywords, the error messages and data about the compulsory statements.

When the compiler loads, the message 'initializing...' is displayed at the top left of the screen, signifying that the compiler is loading in its data from the file CDATA.

Before a program can be compiled or run, certain information is required. I have called this configuring.

When configuring the compiler or the run-time interpreter you must enter either filenames (followed by RETURN) or a Y/N response to a few simple questions (no RETURN required). These include the source and/or object code filenames, whether to show the pcode, whether to print out what will be displayed on the screen and so on.

When compiling, if you want to use the same filename for the source and object code files, when asked for the pcode filename just hit RETURN and it will automatically set to the source code filename. The pcode can be displayed in both the compiler and the run-time interpreter. If you want a printout you can title a standard header which will be printed before any other output.

When printing a compilation the output to the screen will be slightly corrupted due to a quirk of the lexical analyser in the compiler – don't worry about this!

If you want to save the object code and an error occurs, the compiler will not save the code thus protecting the run-time interpreter.

Source and object code filenames can be up to seven characters long. Source files can be created on wordprocessors or text editors that produce pure Ascii text files such as *Wordwise Plus*. Those that produce header code before the text (such as *Interword*) are not compatible since the 'foreign' characters will produce errors.

All source code files must be stored in the C directory. All object pcode files produced will be stored in the P directory. All datafiles created by Cobol programs will be stored in the D directory. If at any time when compiling or running a program you press BREAK or ESCAPE you will be returned to the main menu.

Cobol compilers are usually very strict on the format of a program

Compiling and running

When a program is being compiled, each Cobol program line is displayed as it is in the source text file, with the pcode produced (if selected) after each line.

After the compilation, details such as the number of errors and bytes of pcode (n) are shown. A plus in brackets after the pcode is to remind you that although the pcode used is n bytes long there are also the symbol table and the literals to be accounted for as they are also saved in the pcode file.

When a program is being run the only items of information displayed are the ones that the Cobol program displays (as in a Basic program).

Next month I'll describe how the computer operates and give some example programs. For more background reading on the Cobol language the following books are recommended:

Methodical Cobol Programming by Ray Welland. Published by Pitman.

Structured Cobol Programming by Nancy Stern and Robert A Stern. Published by John Wiley and Sons.

Structured Cobol by Ruth Ashley. Published by John Wiley and Sons.



WIN

AN ACORN A3000 IN OUR 1990

BBC ACORN USER SURVEY

It is that time of year when we at *BBC Acorn User* come to you, the readers, to find out what it is you want to see in this magazine? Of course we are always interested in your ideas and suggestions, indeed articles and programs sent in by readers form a large part of the magazine. However, with this survey we can set ourselves on the right course for a whole year.

First, please do fill in the survey. Each and every response is valuable – you don't even have to own an Acorn micro! The whole survey will be analysed by computer but each questionnaire will be kept confidential. There are quite a few questions, but please take some time over your answers. Your answers will affect the shape of *BBC Acorn User* in the future. Don't exaggerate or pull your punches either. Your answers to the survey won't affect your chances in the competition.

As an incentive for your help, we are offering you the chance to win an Acorn A3000 and colour monitor, kindly donated by Acorn. All you have to do is think up an idea for an article, program or short series for *BBC Acorn User*. The idea must be original and appeal to users of all Acorn machines – 8-bit and 32-bit. We don't want reams of details nor even a working program. All you need send is the essentials of the idea.

When you have answered all the questions, cut out the opposite page and send it, along with your competition entry, to:

BBC Acorn User Survey
Redwood Publishing
20-26 Brunswick Place
London N1 6DJ

To qualify for the competition we must receive your entry by 31st March.

1 Are you:

01❑ Male
02❑ Female

2 How old are you?

01❑ Under 16
02❑ 16-24
03❑ 25-34
04❑ 35-44
05❑ 45-54
06❑ 55 or older

3 What is your occupation?

01❑ Student at school
02❑ Student at college/university
03❑ Teacher/lecturer
04❑ Research and development
05❑ Self employed small business
06❑ Health/welfare
07❑ Media/creative
08❑ Computing/electronics
09❑ Engineering
10❑ Other professional
11❑ Managerial
12❑ Admin/clerical
13❑ Manual/tradesman
14❑ Uniformed services
15❑ Unemployed
16❑ Other ________

4 What micro(s) do you own or regularly use?

At home	At work	
01❑	17❑	BBC model B
02❑	18❑	Electron
03❑	19❑	Master 128, Compact or B+
04❑	20❑	Master 512
05❑	21❑	Archimedes 300 series
06❑	22❑	Archimedes 400 series
07❑	23❑	A3000
08❑	24❑	Commodore Amiga
09❑	25❑	Atari ST
10❑	26❑	Macintosh
11❑	27❑	IBM PC compatible
12❑	28❑	Amstrad PCW
13❑	29❑	Sinclair Spectrum
14❑	30❑	Z88
15❑	31❑	None
16❑	32❑	Other ________

5 Which of the following do you own or intend to buy in the next 12 months?

Own	Intend to buy	
01❑	14❑	Disc drive
02❑	15❑	Hard disc
03❑	16❑	Dot-matrix printer
04❑	17❑	Laser printer
05❑	18❑	Normal monitor
06❑	19❑	Multisync monitor
07❑	20❑	Mouse
08❑	21❑	Beeb sideways Ram
09❑	22❑	Arc expansion Ram
10❑	23❑	Modem
11❑	24❑	MIDI music equipment
12❑	25❑	Hybrid music equipment
13❑	26❑	Other ________

6 What do you mainly use your micro for? (Please tick just one Main Use box)

Main use	Other uses	
01❑	12❑	Programming
02❑	13❑	Learning about computers
03❑	14❑	Computer games
04❑	15❑	School or college work
05❑	16❑	Teaching own children
06❑	17❑	Teaching at school or college
07❑	18❑	Home or personal affairs
08❑	19❑	Business
09❑	20❑	Club or society administration
10❑	21❑	Doing office work at home
11❑	22❑	Other ________

7 What are the main applications you use your micro for?

01❑ Accounting
02❑ Adventure games
03❑ Arcade games
04❑ CAD/CAM
05❑ Communications
06❑ Computer terminal
07❑ Databases
08❑ Desktop publishing
09❑ Control/monitoring
10❑ Graphics/art/design
11❑ Home education
12❑ Music
13❑ Research
14❑ Spreadsheets
15❑ Teaching
16❑ Your own programming
17❑ Wordprocessing
18❑ Other ________

8 What disc system(s) do you use? (Please tick as many as applicable)

01❑ 5.25in 40 track
02❑ 5.25in 80 track
03❑ 3.5in
04❑ DFS
05❑ ADFS

9 Where do you buy your hardware and software?

Sometimes	Most often	
01❑	05❑	High street store
02❑	06❑	Mail order
03❑	07❑	Official Acorn dealer
04❑	08❑	Other ________

10 Estimate your personal software spending over the last and next 12 months:

Last year	Next year	
01❑	07❑	Less than £20
02❑	08❑	£20-£49
03❑	09❑	£50-£99
04❑	10❑	£100-£299
05❑	11❑	£300-£499
06❑	12❑	Over £500

11 Estimate your personal hardware spending over the last and next 12 months:

Last year	Next year	
01❑	07❑	Less than £20
02❑	08❑	£20-£49
03❑	09❑	£50-£99
04❑	10❑	£100-£299
05❑	11❑	£300-£499
06❑	12❑	Over £500

12 What product area(s) do you want to see covered by BBC Acorn User readers offers?

____
____

13 How many orders from BBC Acorn User readers' offers have you made in the last 12 months?

01❑ None
02❑ 1
03❑ 2-5
04❑ more than 5

14 Would you be prepared to pay, say, 50p more for BBC Acorn User magazine and receive the monthly disc free?

01❑ Yes
02❑ No

15 How do you usually get your copy of BBC Acorn User?

02❑ By subscription
03❑ Regular newsagent's order
04❑ Read someone else's/library/school copy
05❑ Buy it regularly

16 For how long have you read BBC Acorn User?

01❑ Less than 3 months
02❑ 3-6 months
03❑ 7-12 months
04❑ More than a year
05❑ Since 1982

17 How many other people read your copy of BBC Acorn User?

01❑ None
02❑ 1-3
03❑ 4 or more

18 Which of the following do you buy or read regularly?

Buy	Read
01❑	12❑ *BBC Acorn User*
02❑	13❑ *A&B Computing*
03❑	14❑ *Beebug*
04❑	15❑ *Computer Shopper*
05❑	16❑ *Educational Computing*
06❑	17❑ *Electron User*
07❑	18❑ *Micro User*
08❑	19❑ *New Scientist*
09❑	20❑ *Personal Computer World*
10❑	21❑ *Personal Computer Weekly*
11❑	22❑ *Times Educational Supplement*

19 Do you read the advertisments and inserts in BBC Acorn User?

01❑ Some
02❑ Most
03❑ All

20 Have you bought mail-order products from advertisements in BBC Acorn User?

01❑ Yes
02❑ No

21 From whom would you order products by mail order?

01❑ Any advertiser in *BBC Acorn User*
02❑ Only regular *BBC Acorn User* advertisers
03❑ Only well-known industry names

22 How would you rate the following features in BBC Acorn User?

	Very useful	Quite useful	Useful	Not useful	Not at all useful
News	01❑	22❑	43❑	64❑	85❑
Eight Bits	02❑	23❑	44❑	65❑	86❑
Risc Revue	03❑	24❑	45❑	66❑	87❑
Program features	04❑	25❑	46❑	67❑	88❑
General features	05❑	26❑	47❑	68❑	89❑
Technical features	06❑	27❑	48❑	69❑	90❑
Education features	07❑	28❑	49❑	70❑	91❑
Yellow pages	08❑	29❑	50❑	71❑	92❑
Languages other than Basic and assembler	09❑	30❑	51❑	72❑	93❑
Software reviews	10❑	31❑	52❑	73❑	94❑
Hardware reviews	11❑	32❑	53❑	74❑	95❑
Games reviews	12❑	33❑	54❑	75❑	96❑
Comms column	13❑	34❑	55❑	76❑	97❑
Music column	14❑	35❑	56❑	77❑	98❑
Education column	15❑	36❑	57❑	78❑	99❑
End User	16❑	37❑	58❑	79❑	100❑
Questions and answers	17❑	38❑	59❑	80❑	101❑
Letters	18❑	39❑	60❑	81❑	102❑
Offers	19❑	40❑	61❑	82❑	103❑
Competitions	20❑	41❑	62❑	83❑	104❑
Readers' free ads	21❑	42❑	63❑	84❑	105❑

23 What subject area(s) would you like to see covered in the BBC Acorn User regular columns?

Comms column ____________________

Music column ____________________

Education column ____________________

24 What additional regular column(s) would you like to see included in BBC Acorn User?

____

25 Finally, to qualify for the competition, think up an article or program suitable for publication in BBC Acorn User which would appeal to all Acorn users. On a separate sheet, write your idea along with your name and address. Attach the sheet to this questionnaire and send them, to arrive not later than 31st March, to:

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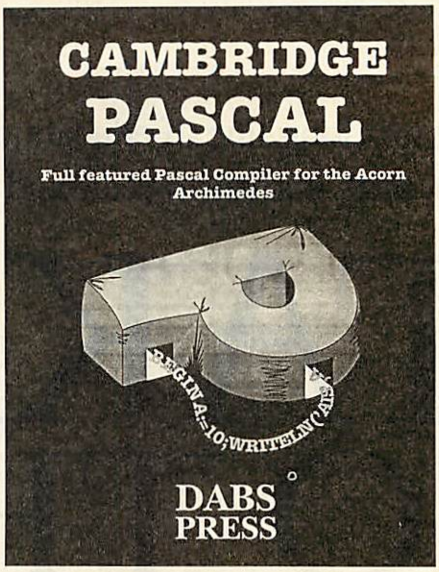
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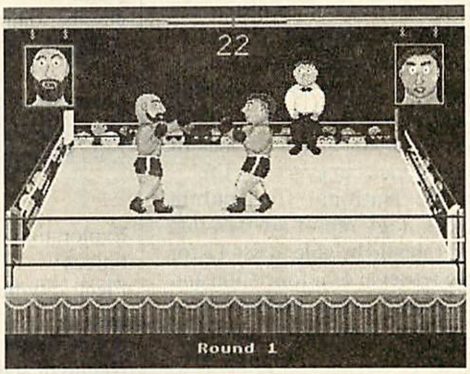
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The latest in a long line of educational floor robots chase **CHRIS DRAGE** and **NICK EVANS** around the classroom

TAKE TO THE FLOOR

Although there are a good number of teachers who see the value of using robotic devices in the classroom as self- evident, there are still quite a few who regard them as being just expensive, unreliable gimmickry.

However, despite what sceptics may think, the National Curriculum orders for science state that within AT12 (level 2) children should 'know that information can be stored using a range of everyday devices, including the computer' and at level 4 'know about the range of uses of microelectronic devices in everyday life'.

Similarly, the National Curriculum design and technology report advises that seven-year-olds should be able to use IT for the storage and retrieval of information and by the age of 11 they should be capable of designing a set of commands to control a robot and to understand a computer program or procedure.

Storing instructions for the movements of a mechanical device is one aspect of IT use which addresses the above requirements in a unified way. Pip (Swallow Systems) and Roamer (Valiant Technology) are two programmable, floor-crawling robots which are eminently suitable tools for the job.

Each device not only meets National Curriculum requirements extremely well, but each helps introduce children to the concepts of programming and control generally and offers a wonderful problem-solving medium. With optional kits, Roamer can even extend these areas of learning to control systems.

English	
Speaking/listening	Level 1
Reading	Level 1
Writing	Level 1
Spelling	Level 1
Mathematics	
Number	Level 1-3
Number operations	Level 1
Apply shape/space application	Level 1-2
Shape/space transformation	Level 1
Data collection/recording	Level 1
Data interpretation	Level 1
Science	
Exploration	Level 1-4
Forces	Level 1-4
Electricity/magnetism	Level 1
IT	Level 3
Sound/music	Level 2
Nature of science	Level 5

A brief summary of the areas of the National Curriculum core subjects which relate to both Pip and Roamer

Included with Roamer is a user guide, activity book, a card of face shapes and a photocopiable program record sheet.

Roamer is powered by two PJ996 ('lantern') batteries (which are not included). Alternatively, the robot can be powered by an optional rechargeable battery pack and charger. To conserve the batteries Roamer has a 'time out' feature which switches the power off after half an hour of non-use. A resident test program provides reassurance the batteries are operational.

Roamer is programmed using a control panel on its back which is clearly laid out and easy for children to use. Looking for all the world like a huge Smartie, the robot appeals to children of either gender.

Roamer travels in preset 'Roamer-lengths' (of approximately 30cm). Instructions, based on Logo commands are entered on a touch keypad comprising move, turn, wait, repeat, procedure and sense keys.

Up to 60 commands can be entered, each with a reassuring beep every time the correct key is pressed. Incorrect presses are met with a buzz and are ignored. Only when the user is programming procedures do the key strokes differ in tone.

Roamer can perform many hundreds of operations as both procedures and repeats can be used. The capacity to use procedures permits a top-down approach to programming. To keep things simple, no use of variables or recursion is possible. However, this does not prove a handicap in practice.

Teachers are provided with a degree of control over the programming environ-



Roamer: looking like a big smartie



Roamer performs hundreds of operations



Robots offer a good problem-solving media

ment. For example, units of distance and turning can be scaled as necessary to suit the abilities of children. For example, degrees can be substituted with quarter, half or full turns for younger children.

Conversely, children at the second key stage will benefit by being able to program in centimetre units and degrees. Once entered and stored, procedures form the basis for more complex and concise programs. For instance, one procedure can be called from within another.

Roamer is also a platform on which children can create Roamer characters by adding mechanical components and/or junk materials in order to turn it into a character like a fire engine, plane, clown or dog. Plastic jackets are available for decoration or for the addition of structures.

Roamer is capable of producing rudimentary music which not only adds realism and colour to the robot character but offers children another avenue of exploration. The octave, tempo, duration and pitch of the notes can be specified. Roamer can play notes over five octaves of sol-fa scales, at one of five tempos.

Valiant has a range of other enhancements under development, including identity kits, a pen pack, a computer interface kit, a control box and associated motor, plus sensor and light packs.

Resembling a black shoe box, Pip is an extremely robust and reliable programmable vehicle. In fact it's so robust it can withstand the weight of a adult. The manufacturer is confident that it will survive five years of classroom use.

It too has a keypad on its back and provides a flat, mobile platform on which Lego baseplates and so on can be affixed with the special adhesive tape provided.

Unlike Roamer, Pip houses its own rechargeable batteries and is provided with a mains transformer. This means it's a simple matter at every end of the day to put Pip on charge, in situ, ready for the next day's programming. Pip can assume all manner of characterisations as constructions from junk and other materials can be easily secured onto its cuboid casing.

The keypad offers 24 touch-sensitive keys (6x4), 14 of which are command keys while the 10 remaining keys form a numeric keypad also labelled with musical notes corresponding to those on a descant recorder. Pip can be made to move forwards, backwards, turn right or left, play musical notes, flash an LED or pause.

When programming Pip you are limited to 39 steps but Repeat/ End sequences can be nested up to three deep extending Pip's capability. However, when programming musical notes the limit is soon reached.

Although Pip lacks the ability to use procedures it makes up for it by offering a highly consistent programming environment and level of control which young children (and adults) find particularly easy to learn. Correct key presses are accepted with an audible beep while Pip 'grumbles' at incorrect entries.

Once a program is correctly executed Pip 'sings' a song, providing a sharp-earred teacher with audible feedback on how well the children are doing.

Pip, like Roamer, has a built-in test program so even young children can make it perform. The test program is of value in ascertaining the state of the batteries or whether the operating surface is suitable.

In development is a computer interface which will permit Pip programs to be stored on a BBC disc for later retrieval.

Pip travels in centimetre units and turns by degrees. On a hard, smooth surface it is very accurate indeed, thanks to the use of stepper motors. A scaling plug can be inserted in Pip's charger port which will scale travelling and turning by a factor of 10 which considerably eases the programming burden for young children.

At present Pip does not possess any hardware for control applications other than its very versatile charger port. If equipped with the necessary interface, there seems to be no reason why Pip should not be able to read sensors and possibly control outputs to bulbs or motors.


Pip is robust and reliable


Pip is especially suited to young children


Robots evoke great motivation in children

The obvious question is of course 'which robot should my school buy?'. However, the answer is not quite as easy as you might expect from looking at the respective price tags. Each of these floor crawling robots is well conceived and designed for the tasks expected of it but they are probably suited for different age groups/needs and working environments.

Pip costs more than Roamer but there is little more to add other than the computer interface, thus it represents low cost of ownership as opposed to Roamer's low initial cost. It is certainly more robust and accurate both in terms of distance and turning. In addition, its rechargeable battery is convenient, its shape practical for attaching structures and it maintains a simple level of control for younger children.

However, it lacks the flexibility of Roamer's procedural approach to programming and, as yet, any potential for control applications. What this suggests is that Pip may be more suited for children at key stage 1 and for those with special needs, while Roamer's versatility may prove more suited for older children.

Although Pip and Roamer enjoy a close relationship with Logo neither can be regarded as alternatives to a Logo floor turtle, as this is a precision tool and its higher price reflects this fact.

Most teachers who have tried using robotics as a theme or who have integrated a robot into their classroom activities would agree that robots like Pip or Roamer evoke a great deal of interest and motivation for all children and provide a vehicle (sorry!) for thinking, problem-solving and for development of IT skills.

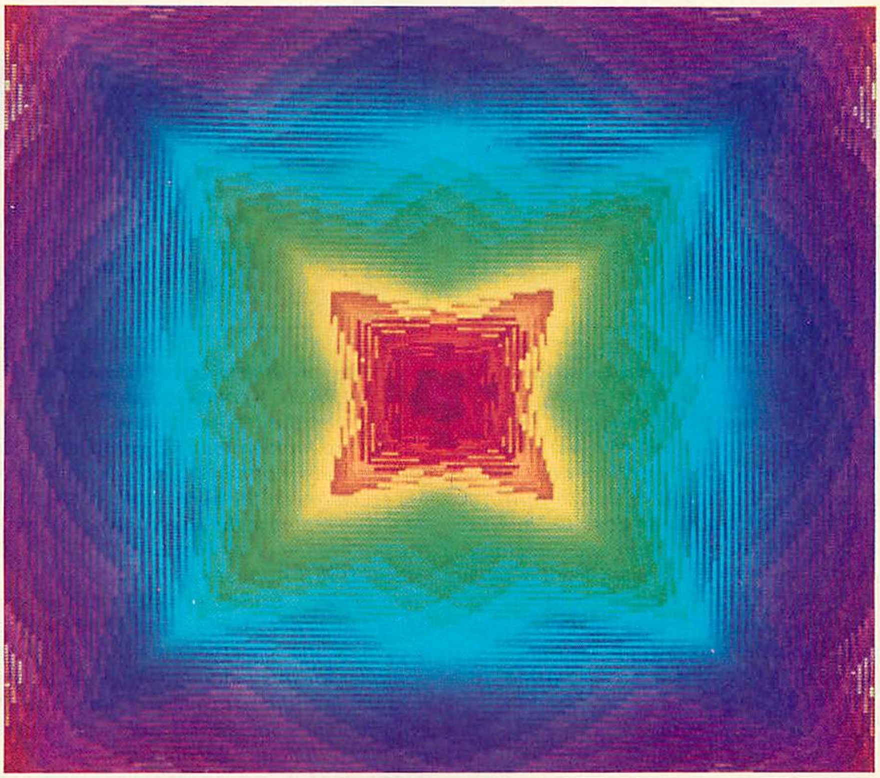
They also provide a focus for work in science and technology generally. In addition, there are a multitude of spin-offs in terms of mathematics.

The main attributes of both Pip and Roamer are that these robots offer technologically inexperienced teachers and pupils programmable devices which are simple and safe to use, make no demands on the classroom computer and will prove valuable aids in delivering the science and technology National Curricula.

Roamer is available from Valiant Technology, Gulf House, 370 Old York Road, Wandsworth, London SW18 1SP. Price: £80 + p&p.

Pip comes from Swallow Systems, 32 High Street, High Wycombe, Bucks, HP11 1BR. Price: £224 + p&p or £9.20 per week rental (cash with order: £191 + p&p).

Yet more colourful and animated patterns for the Archimedes and the A3000 from **WALTER TRYPSIN**



ONE GOOD TURN

Over the last couple of years, a number of colourful pattern generators have appeared in *BBC Acorn User*. These include the now infamous Mandelbrot set, the HodgePodge machine and the Wallpaper generator. This month sees the premiere of Turnip2/1.

Using the program

The program is ready to run immediately, so simply type in the listing on the yellow pages and run it. After a short pause, the default pattern of some rainbow-coloured radial lines is drawn and then the Turnip2/1 algorithm swings into action and sends the screen into an ever-changing kaleidoscope of breathtaking and hypnotic splendour.

While the program is running, pressing SPACE will reverse the direction of 'swirl'. This can be particularly effective if pressed early so the screen returns (albeit briefly) to its initial pattern and then starts swirling in the opposite direction.

If you wish to hold a particular pattern for any reason, pressing RETURN will freeze the program until released. ESCAPE will stop the program and return you to Basic.

When you get bored with this there are a number of ways in which the program can be tweaked.

As it stands, there are two colour schemes and four patterns. To try them out, the PROCdraw in line 110 should be changed as appropriate. Various constants have been set up to facilitate this so the first parameter can be set to any of the following:

Rays: radial lines
Squares: rotated concentric squares
Rings: simple concentric circles
String: 'Nail and String' type pattern

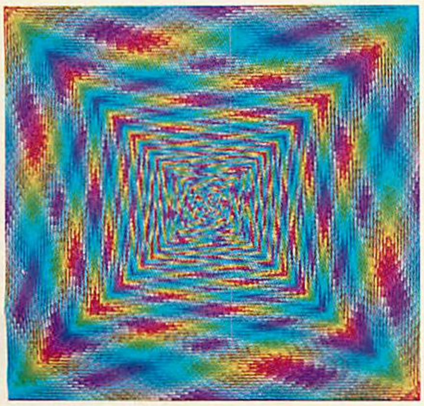
The second parameter sets the colour scheme, this can be either of:

Spectrum: a full 'ROYGBIV' colour spectrum
Bands: varying intensities of red, green, yellow, blue, magenta, cyan and white

The third parameter sets the scale of the pattern – bigger numbers will produce 'larger' (more chunky) patterns.

It is also possible to change the size and type of swirl used, if you wish to experiment with this, you'll need to adjust the PROCcode in line 90. The first parameter here sets the size of the swirl in pixels – it can be set to any integer between 1 and 128. The second parameter sets the direction of swirl.

If all this wasn't enough, the program has been designed so that you can add your own patterns and colour schemes.



How it works

The program is really just a visual effect rather than an actual pattern generator. The swirling effect is created quite simply by moving the pixels around the screen in concentric squares.

The 'size' parameter controls how many squares are rotated. The direction parameter controls which way each square is rotated, either the same (but opposite) directions 'left' and 'right' or alternating left and right with 'both'. Some patterns work best with 'left' and 'right' and some with 'both'.

The actual movement is performed in Arm code for speed, and the main loop (starting at .sideloop) has been 'unwound' for optimal performance (no decrementing and looping).

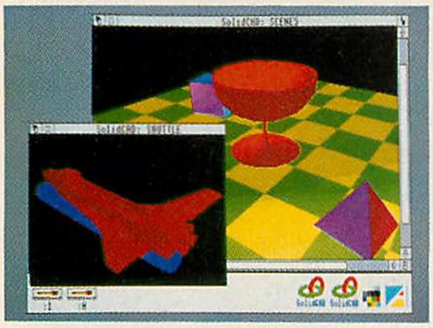
If you want to add your own colour schemes or patterns, just add extra WHEN statements to the CASE statements in DEF PROCdraw and place your procedures at the end of the program. The origin (0,0) is set to the centre of the screen and a graphics window 256 pixels wide has been defined. The pattern drawing procedures are called with the variable 'val' starting at 0, and increasing until it reaches 256.

MAIN PROCEDURES	
PROCcode(size,flag)	Assemble code for given swirl direction and square size
PROCrun	Run the algorithm. Check for SPACE and RETURN presses
PROCinit	Set up screen and pattern and colour constants
PROCdraw(pattern, colours,step)	Draw a pattern of given step size and colour
DEFAULT COLOUR SCHEME PROCEDURES	
PROCsetspec	Initialise the r%(), g%() and b%() arrays to colour values
PROCspectrum(a%)	Set foreground colour to spectrum colour a% (0-71)
PROCgcol(col%,int%)	Set foreground colour to col% (1-7), intensity int% (0-11)
DEFAULT PATTERN PROCEDURES	
PROCrays(x%,s%)	Radial line s% thick at x%
PROCsquare(x%)	Rotated square (size and angle x%)
PROCring(x%)	Filled circle (radius x%)
PROCstring(x%)	'String' square at x%

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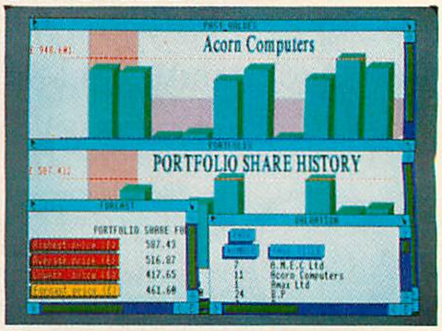
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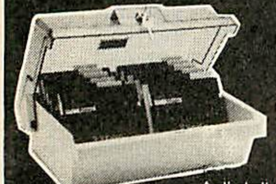
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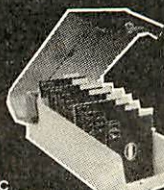
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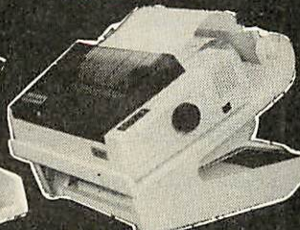
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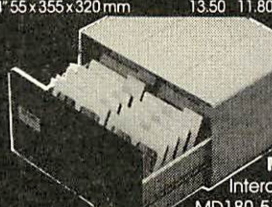
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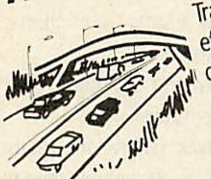
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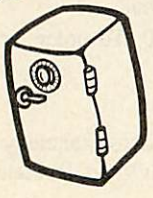
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COMPATIBILITY

Program	Page	BBC B	B+/128	Master 128	Master Compact	Electron	Arc	6502SP/ Turbo	ADFS	Econet	Shadow RAM	Monthly Disc
Eight Bits	23											
Listing 1 (1)		■	■	■	■	■		■	■	■	■	■
Listing 2 (2)		■	■					■	■	■	■	■
Listing 3		■	■	■	■			■	■		■	■
Risc Revue	30											
Listings 1-3							■		■	■	■	■
RiscOs Skeleton	59											
Listings 1-4							■		■	■	■	■
Cobol	70											
Listing 1-2		■	■	■	■			■	■	■	■	■
Turnip	81											
Listing 1							■		■	■	■	■

Note
(1) requires View (2) requires Stop Press

EIGHT BITS

Listing 1

```
   10 REM View Sort
   20 REM for BBC B/B+/E/M/C
   30 REM by David Atherton
   40 REM (c) Acorn User Mar 90
   50 :
   60 M%=&900
   70 FOR pass=0 TO 3 STEP 3
   80 endview=&D
   90 delim=13
  100 marker1=&53
  110 marker2=&55
  120 ptrA=&90
  130 ptrB=ptrA+2
  140 flag=ptrA+4
  150 start=ptrA+5
  160 end=start+2
  170 buffer=&C00
  180 osasci=&FFE3
  190 osbyte=&FFF4
  200 P%=M%
  210 :
  220 [OPT pass
  230 .viewsort
  240 LDA marker1+1
  250 BEQ nomarks
  260 LDA marker2+1
  270 BEQ nomarks
  280 LDY #3
  290 .loop8
  300 LDA marker1,Y
  310 STA start,Y
  320 DEY
  330 BPL loop8
  340 BMI sort
  350 .nomarks
  360 LDA #131
  370 JSR osbyte
  380 STX start
  390 INY
  400 STY start+1
  410 LDA endview
  420 STA end
  430 LDA endview+1
  440 STA end+1
  450 :
  460 .sort
  470 LDY #6
  480 .loop9
  490 LDA sorting,Y
  500 JSR osasci
  510 DEY
  520 BPL loop9
  530 .sort1
  540 LDA #ASC"."
  550 JSR osasci
  560 LDA #0
  570 STA flag
  580 LDA start
  590 STA ptrA
  600 LDA start+1
  610 STA ptrA+1
  620 :
  630 .loop6
  640 JSR compare
  650 JSR endyet
  660 BCC loop6
  670 :
  680 LDA flag
  690 BNE sort1
  700 LDY #6
  710 .loop10
  720 LDA #13
  730 JMP osasci
  740 :
  750 .compare
  760 JSR mcfindnext
  770 LDY #0
  780 .loop5
  790 LDA (ptrA),Y
  800 CMP (ptrB),Y
  810 BNE different
  820 CMP #delim
  830 BEQ noswap
  840 INY
  850 BNE loop5
  860 .different
  870 BCC noswap
  880 JSR mcswap
  890 .noswap
  900 JSR aisb
  910 RTS
  920 :
  930 .mcswap
  940 JSR a2buf
  950 JSR mcfindnext
  960 JSR b2a
  970 JSR updateB
  980 JSR buf2b
  990 LDA #1
 1000 STA flag
 1010 RTS
 1020 :
 1030 .mcfindnext
 1040 LDY #0
 1050 .loop4
 1060 LDA (ptrA),Y
 1070 CMP #delim
 1080 BEQ done4
 1090 INY
 1100 BNE loop4
 1110 .done4
 1120 INY
 1130 TYA
 1140 CLC
 1150 ADC ptrA
 1160 STA ptrB
 1170 LDA #0
 1180 ADC ptrA+1
 1190 STA ptrB+1
 1200 RTS
 1210 :
 1220 .a2buf
 1230 LDY #0
 1240 .loop1
 1250 LDA (ptrA),Y
 1260 STA buffer,Y
 1270 CMP #delim
 1280 BEQ done1
 1290 INY
 1300 BNE loop1
 1310 .done1
 1320 RTS
 1330 :
 1340 .b2a
 1350 LDY #0
 1360 .loop2
 1370 LDA (ptrB),Y
 1380 STA (ptrA),Y
 1390 CMP #delim
 1400 BEQ done2
 1410 INY
 1420 BNE loop2
 1430 .done2
 1440 RTS
 1450 :
 1460 .updateB
 1470 INY
 1480 TYA
 1490 CLC
 1500 ADC ptrA
 1510 STA ptrB
 1520 LDA #0
 1530 ADC ptrA+1
 1540 STA ptrB+1
 1550 RTS
 1560 :
 1570 .buf2b
 1580 LDY #0
 1590 .loop3
 1600 LDA buffer,Y
 1610 STA (ptrB),Y
 1620 CMP #delim
 1630 BEQ done3
 1640 INY
 1650 BNE loop3
 1660 .done3
 1670 RTS
 1680 :
 1690 .aisb
 1700 LDA ptrB
 1710 STA ptrA
 1720 LDA ptrB+1
 1730 STA ptrA+1
 1740 RTS
 1750 :
 1760 .endyet
 1770 JSR mcfindnext
 1780 LDA ptrB+1
 1790 CMP end+1
 1800 BNE notend
 1810 LDA ptrB
 1820 CMP end
 1830 .notend
 1840 RTS
 1850 .sorting
 1860 EQUS "gnitroS"
 1870 ]NEXT
 1880 a$="SAVE VSORT "+STR$~M%+" "+STR$~
P%
 1890 PRINT a$
 1900 PRINT"Press a key to save"
 1910 IF GET THEN OSCLI a$
 1920 END
```

```
   10 REM Edit Slot
   20 REM by Paul Walker
   30 REM for B/B+/E/M/C
   40 REM (c) BAU Mar 90
   50 :
   60 MODE 4
   70 MOVE 440,720
   80 DRAW 1000,720
   90 DRAW 1000,784
  100 DRAW 440,784
  110 DRAW 440,720
  120 PRINT "This is an example"
  130 X$=FNslot("Default",15,8,15,TRUE)
  140 PRINT TAB(0,18)"You entered ";X$
  150 END
  160 :
15500 DEFFNslot(st$,xco,yco,len,typ)
15510 REM xco=tab x, yco=tab y, len=leng
th, typ=TRUE; string, FALSE; numeric
15520 VDU23,1,1;0;0;0;
15530 *FX4,1
15540 PRINTTAB(xco,yco);st$
15550 VDU31,xco,yco
15560 REPEAT
15570 key=GET
15580 IFkey=136ANDPOS=xco THENVDU7
15590 IFkey=136ANDPOS>xco THENVDU8
15600 IFkey=137ANDPOS=xco+LEN(st$)THENVD
U7
15610 IFkey=137ANDPOS<xco+LEN(st$)THENVD
U9
15620 IFkey=135THENst$=FNDEL
15630 IFkey=127THENst$=FNDEL2
15640 IFkey>31ANDkey<126THENst$=FNADD
15650 UNTILkey=13
15660 *FX4,0
15670 VDU23,1,0;0;0;0;
15680 IFtyp=TRUE THEN=st$ ELSE=EVAL(st$)
15690 DEFFNDEL
15700 pos=POS
15710 IFpos-xco>=LEN(st$)THENVDU7:=st$
15720 ln=LEN(st$)
15730 st$=LEFT$(st$,pos-xco)+RIGHT$(st$,
ln+xco-pos-1)
15740 PRINTTAB(xco,yco)st$;CHR$32;TAB(po
s,yco);
15750 =st$
15760 DEFFNADD
15770 pos=POS
15780 IFLEN(st$)=len THENVDU7:pos=pos-1:
=st$
15790 IFtyp=FALSE ANDNOT(key>47ANDkey<58
ORkey=46)THENVDU7:pos=pos-1:=st$
15800 ln=LEN(st$)
15810 st$=LEFT$(st$,pos-xco)+CHR$(key)+R
IGHT$(st$,ln+xco-pos)
15820 PRINTTAB(xco,yco)st$;TAB(pos+1,yco
);
15830 =st$
15840 DEFFNDEL2
15850 pos=POS
15860 IFpos=xco THENVDU7:=st$
15870 ln=LEN(st$)
```

Continued ▶

EIGHT BITS

◀ Continued

```
15880 IFpos=ln+xco THENst$=LEFT$(st$,pos
-xco-1)ELSEst$=LEFT$(st$,pos-xco-1)+CHR$
32+RIGHT$(st$,ln+xco-pos)
15890 PRINTTAB(xco,yco)st$;CHR$32;TAB(po
s-1,yco);
15900 =st$
```

Listing 2

```
10 REM Stop Press Image Enhancer
20 REM by Alan Hodge
30 REM for BBC B/B+
40 REM (c) BAU Mar 90
50 :
60 mc=&2900
70 array=&2100
80 oswrch=&FFEE
90 PROCassemble
100 *SAVE mEnhanc 2900 2B71
110 END
120 :
130 DEF PROCassemble
140 point_l=&80
150 point_h=&81
160 store_l=&82
170 store_h=&83
180 count=&84
190 tl=&70
200 tc=&71
210 tr=&72
220 ml=&73
230 cc=&74
240 mr=&75
250 bl=&76
260 bc=&77
270 br=&78
280 :
290 low_x=&86
300 high_x=&87
310 low_y=&88
320 high_y=&89
330 low_temp=&79
340 high_temp=&7A
350 end_low_y=&8A
360 end_high_y=&8B
370 low_x_win=&8C
380 high_x_win=&8D
390 low_x_win_end=&8E
400 high_x_win_end=&8F
410 :
420 FOR pass=0 TO 3 STEP3
430 P%=mc
440 [ OPT pass
450 .mc_image
460 LDA &80
470 PHA
480 LDA &306
490 STA end_low_y
500 LDA &307
510 STA end_high_y
520 CLC
530 LDA end_low_y
540 ADC end_low_y
550 STA end_low_y
560 LDA end_high_y
570 ADC end_high_y
580 STA end_high_y
590 CLC
600 LDA end_low_y
610 ADC end_low_y
620 STA end_low_y
630 LDA end_high_y
640 ADC end_high_y
650 STA end_high_y
660 :
670 LDA &302
680 STA low_y
690 LDA &303
700 STA high_y
710 CLC
720 LDA low_y
730 ADC low_y
740 STA low_y
750 LDA high_y
760 ADC high_y
770 STA high_y
780 CLC
790 LDA low_y
800 ADC low_y
810 STA low_y
820 LDA high_y
830 ADC high_y
840 STA high_y
850 LDA &300
860 PHA
870 LDA &301
880 PHA
890 LDA &304
900 PHA
910 LDA &305
920 PHA
930 LDA #0
940 STA count
950 LDA &300
960 STA low_x_win
970 LDA &301
980 STA high_x_win
990 LDA &304
1000 STA low_x_win_end
1010 LDA &305
1020 STA high_x_win_end
1030 LDA #0
1040 STA &300
1050 STA &301
1060 LDA #127
1070 STA &304
1080 LDA #2
1090 STA &305
1100 .y_loop
1110 JSR image
1120 CLC
1130 LDA low_y
1140 ADC #4
1150 STA low_y
1160 LDA high_y
1170 ADC #0
1180 STA high_y
1190 CMP end_high_y
1200 BNE y_loop
1210 LDA low_y
1220 CMP end_low_y
1230 BNE y_loop
1240 PLA
1250 STA &305
1260 PLA
1270 STA &304
1280 PLA
1290 STA &301
1300 PLA
1310 STA &300
1320 PLA
1330 STA &80
1340 RTS
1350 :
1360 .image
1370 CLC
1380 LDA low_y
1390 ADC #4
1400 STA point_bl+2
1410 LDA high_y
1420 ADC #0
1430 STA point_bl+3
1440 LDX #point_bl MOD 256
1450 LDY #point_bl DIV 256
1460 LDA #&9
1470 JSR &FFF1
1480 :
1490 CLC
1500 LDA &D6
1510 ADC &31A
1520 STA point_l
1530 LDA &D7
1540 ADC #0
1550 STA point_h
1560 SEC
1570 LDA point_l
1580 SBC #3*8
1590 STA point_l
1600 LDA point_h
1610 SBC #0
1620 STA point_h
1630 :
1640 LDX count
1650 INX
1660 CPX #3
1670 BNE not_mod
1680 LDX #0
1690 .not_mod
1700 CLC
1710 LDA #255
1720 ADC table_low,X
1730 STA store_l
1740 LDA #0
1750 ADC table_high,X
1760 STA store_h
1770 DEC store_h
1780 LDX #79
1790 .byte_loop
1800 LDY #0
1810 LDA (point_l),Y
1820 LDY #7
1830 .bit_loop
1840 PHA
1850 AND #&01
1860 STA (store_l),Y
1870 PLA
1880 LSR A
1890 DEY
1900 BPL bit_loop
1910 :
1920 CLC
1930 LDA store_l
1940 ADC #8
1950 STA store_l
1960 LDA store_h
1970 ADC #0
1980 STA store_h
1990 CLC
2000 LDA point_l
2010 ADC #8
2020 STA point_l
2030 LDA point_h
2040 ADC #0
2050 STA point_h
2060 DEX
2070 BPL byte_loop
2080 :
2090 .in_loop
2100 LDA low_x_win
2110 STA low_x
2120 LDA high_x_win
2130 STA high_x
2140 STA cc
2150 STA tc
2160 STA bc
2170 STA ml
2180 STA tl
2190 STA bl
2200 :
2210 .x_loop
2220 JSR check
2230 CLC
2240 LDA low_x
2250 ADC #1
2260 STA low_x
2270 LDA high_x
2280 ADC #0
2290 STA high_x
2300 CMP high_x_win_end
2310 BNE x_loop
2320 LDA low_x
2330 CMP low_x_win_end
2340 BNE x_loop
2350 :
2360 INC count
2370 LDA count
2380 CMP #3
2390 BNE return
2400 LDA #0
2410 STA count
2420 .return
2430 RTS
2440 :
2450 .check
2460 LDX count
2470 LDY #0
2480 CLC
2490 LDA low_x
2500 ADC table_low,X
2510 STA low_temp
2520 LDA high_x
2530 ADC table_high,X
2540 STA high_temp
2550 LDA (low_temp),Y
2560 STA mr
2570 :
2580 INX
2590 CPX #3
2600 BNE no_sub_tr
2610 LDX #0
2620 CLC
2630 LDA table_low
2640 ADC low_x
2650 STA low_temp
2660 LDA table_high
2670 ADC high_x
2680 STA high_temp
2690 JMP find_tr
2700 .no_sub_tr
2710 CLC
2720 LDA low_temp
2730 ADC #(642 MOD 256)
2740 STA low_temp
2750 LDA high_temp
2760 ADC #(642 DIV 256)
2770 STA high_temp
2780 .find_tr
2790 LDA (low_temp),Y
2800 STA tr
2810 :
2820 INX
2830 CPX #3
2840 BNE no_sub_br
2850 LDX #0
2860 CLC
2870 LDA table_low
2880 ADC low_x
2890 STA low_temp
2900 LDA table_high
2910 ADC high_x
2920 STA high_temp
2930 JMP find_br
2940 .no_sub_br
2950 CLC
2960 LDA low_temp
2970 ADC #(642 MOD 256)
2980 STA low_temp
2990 LDA high_temp
3000 ADC #(642 DIV 256)
3010 STA high_temp
3020 .find_br
3030 LDA (low_temp),Y
3040 STA br
3050 :
3060 LDA cc
3070 BNE slide
3080 CLC
3090 LDA tc
3100 ADC ml
3110 ADC mr
3120 ADC bc
3130 CMP #2
3140 BNE slide
3150 :
3160 LDA tc
3170 BEQ not_tl
3180 LDA ml
3190 BEQ not_tl
3200 LDA tr
3210 BNE plot_dot
3220 LDA bl
3230 BNE plot_dot
3240 .not_tl
3250 LDA tc
3260 BEQ not_tr
3270 LDA mr
3280 BEQ not_tr
3290 LDA tl
3300 BNE plot_dot
3310 LDA br
3320 BNE plot_dot
3330 .not_tr
3340 LDA bc
3350 BEQ not_bl
3360 LDA ml
3370 BEQ not_bl
3380 LDA tl
3390 BNE plot_dot
3400 LDA br
3410 BNE plot_dot
3420 .not_bl
3430 LDA bc
3440 BEQ not_br
3450 LDA mr
3460 BEQ not_br
3470 LDA tr
3480 BNE plot_dot
3490 LDA bl
3500 BNE plot_dot
3510 .not_br
3520 .slide
3530 LDA tc
3540 STA tl
3550 LDA cc
3560 STA ml
3570 LDA bc
3580 STA bl
3590 LDA tr
3600 STA tc
3610 LDA mr
3620 STA cc
3630 LDA br
3640 STA bc
3650 RTS
3660 :
3670 .plot_dot
3680 LDA #25
3690 JSR oswrch
3700 LDA #69
3710 JSR oswrch
3720 LDA low_x
3730 ASL A
3740 PHP
3750 JSR oswrch
3760 LDA high_x
3770 ASL A
3780 PLP
3790 ADC #0
3800 JSR oswrch
3810 LDA low_y
3820 JSR oswrch
3830 LDA high_y
3840 JSR oswrch
3850 JMP slide
3860 :
3870 .table_low
3880 EQUB (642*0+array) MOD 256
3890 EQUB (642*1+array) MOD 256
3900 EQUB (642*2+array) MOD 256
3910 .table_high
3920 EQUB (642*0+array) DIV 256
3930 EQUB (642*1+array) DIV 256
3940 EQUB (642*2+array) DIV 256
3950 :
3960 .point_bl
3970 EQUD &00000030
3980 EQUB &00
3990 ]
4000 NEXT pass
4010 ENDPROC
```

Listing 3

```
10 REM ADFS/Net Problem Locator
20 REM for B/B+/M/C
30 REM by Joe Abley
40 REM (c) BAU Mar 90
50 :
60 MODE 135
70 PROCinit
80 VDU 141,131:PRINT "BAU Econet Dodg
y Line Locator"
90 VDU 141,131:PRINT "BAU Econet Dodg
y Line Locator"
100 VDU 28,0,24,39,3
110 REPEAT
120 CLS
```

Continued ▶

EIGHT BITS

◀ **Continued**

```
  130 REPEAT
  140 INPUT "Directory name? "name$
  150 UNTIL FNdir
  160 PRINT'"Print? (Y/N/*) ";
  170 REPEAT
  180 key%=GET AND &DF
  190 print%=(key%=89)
  200 IF key%=10 THEN INPUT LINE "*"os$:
PROCoscli(os$):PRINT'"Print? (Y/N/*) ";
  210 UNTIL key%=89 OR key%=78
  220 VDU key%:PRINT'
  230 IF print% THEN VDU 2
  240 PROCdisplay_dodgy(FNpathname)
  250 IF print% THEN VDU 3 ELSE PRINT'"P
ress SPACE to continue";:REPEAT UNTIL GE
T=32
  260 UNTIL FALSE
  270 :
  280 DEF PROCinit
  290 room%=HIMEM-TOP-&800
  300 DIM buffer% room%
  310 DIM block% &10,data% &100
  320 DIM os% &100
  330 ENDPROC
  340 :
  350 DEF FNdir
  360 X%=block% MOD &100
  370 Y%=block% DIV &100
  380 A%=5
  390 !block%=data%
  400 $data%=name$
  410 found%=((USR(&FFDD) AND &FF)=2)
  420 IF NOT(found%) THEN PRINT'"Dir not
 found"':=0
  430 PROCoscli("DIR "+name$)
  440 =TRUE
  450 :
  460 DEF FNnoright(a$)
  470 IF RIGHT$(a$,1)=" " THEN =FNnorigh
t(LEFT$(a$,LEN(a$)-1)) ELSE =a$
  480 :
  490 DEF FNpathname
  500 LOCAL a$
  510 a$=FNpname
  520 PROCoscli("DIR "+a$)
  530 =a$
  540 :
  550 DEF FNpname
  560 LOCAL a$
  570 a$=FNnoright(FNdir_name)
  580 *DIR ^
  590 IF a$="$" THEN =a$ ELSE =FNpname+"
."+a$
  600 :
  610 DEF FNdir_name
  620 block%!1=data%
  630 A%=6
  640 X%=block% MOD &100
  650 Y%=block% DIV &100
  660 CALL &FFD1
  670 data%?(3+data%?(1+?data%))=&D
  680 =$(data%+2+?data%)
  690 :
  700 DEF PROCdisplay_dodgy(path$)
  710 LOCAL file%
  720 file%=0
  730 REPEAT
  740 block%!1=data%
  750 block%!5=1
  760 block%!9=file%
  770 A%=8
  780 X%=block% MOD &100
  790 Y%=block% DIV &100
  800 CALL &FFD1
  810 data%?(1+?data%)=&D
  820 f$=FNnoright($(data%+1))
  830 $data%=f$
  840 end%=(block%!5=1)
  850 IF NOT(end%) THEN PROCdofile
  860 file%=file%+1
  870 UNTIL end%
  880 ENDPROC
  890 :
  900 DEF PROCdofile
  910 LOCAL type%,end%
  920 !block%=data%
  930 A%=5
  940 X%=block% MOD &100
  950 Y%=block% DIV &100
  960 type%=USR&FFDD AND &FF
  970 IF type%=2 THEN PROCoscli("DIR "+f
$):PROCdisplay_dodgy(path$+"."+f$):*DIR
^
  980 IF type%=1 THEN PROCcheck_file(f$)
  990 ENDPROC
 1000 :
 1010 DEF PROCcheck_file(f$)
 1020 PRINT path$;".";f$;" is ";
 1030 exec%=block%!6 AND &FFFF
 1040 IF exec%<>&802B AND exec%<>&8023 A
ND exec%<>&8021 THEN PRINT "not BASIC":E
NDPROC
 1050 IF block%!10>room% THEN PRINT "too
 long":ENDPROC
 1060 PROCoscli("LOAD "+f$+" "+STR$~buff
er%)
 1070 ptr%=0
 1080 ok%=TRUE
 1090 REPEAT
 1100 line%=buffer%?(ptr%+1)*256+buffer%
?(ptr%+2)
 1110 IF line%<&8000 THEN PROCcheck_line
 1120 UNTIL line%>=&8000
 1130 IF ok% THEN PRINT "BASIC checked O
K"
 1140 ENDPROC
 1150 :
 1160 DEF PROCcheck_line
 1170 line$=$(buffer%+ptr%+3)
 1180 IF INSTR(line$,CHR$(255)) THEN PRO
Cdodgy("OSCLI")
 1190 IF INSTR(line$,CHR$(42)) THEN PROC
star
 1200 IF INSTR(line$,CHR$(&AD)) THEN PRO
Cdodgy("OPENUP")
 1210 IF INSTR(line$,CHR$(&AE)) THEN PRO
Cdodgy("OPENOUT")
 1220 IF INSTR(line$,CHR$(&8E)) THEN PRO
Cdodgy("OPENIN")
 1230 IF INSTR(line$,CHR$(&C8)) THEN PRO
Cdodgy("LOAD")
 1240 IF INSTR(line$,CHR$(&D7)) THEN PRO
Cdodgy("CHAIN")
 1250 IF INSTR(line$,":") THEN PROCcolon
 1260 ptr%=ptr%+buffer%?(ptr%+3)
 1270 ENDPROC
 1280 :
 1290 DEF PROCdodgy(reason$)
 1300 IF ok% THEN PRINT "dodgy:":ok%=FAL
SE
 1310 PRINT SPC(4);RIGHT$("     "+STR$(l
ine%),5);"  --  ";reason$;" found."
 1320 ENDPROC
 1330 :
 1340 DEF PROCstar
 1350 p%=LEN(line$)
 1360 REPEAT
 1370 IF p%<>1 THEN p%=p%-1
 1380 UNTIL p%=1 OR MID$(line$,p%,1)<>"
"
 1390 IF MID$(line$,p%,1)=CHR$(&8C) OR M
ID$(line$,p%,1)=CHR$(&8B) OR MID$(line$,
p%,1)=":" OR p%=1 THEN PROCdodgy("STAR")
 1400 ENDPROC
 1410 :
 1420 DEF PROCcolon
 1430 p%=INSTR(line$,":")
 1440 IF INSTR(MID$(line$,p%,3),".") THE
N PROCdodgy("DRIVE REF")
 1450 ENDPROC
 1460 :
 1470 DEF PROCoscli(os$)
 1480 LOCAL X%,Y%
 1490 $os%=os$
 1500 X%=os% MOD &100
 1510 Y%=os% DIV &100
 1520 CALL &FFF7
 1530 ENDPROC
```

RISC REVUE

Listing 1

```
   10 REM >!RunImage (RR1)
   20 REM Main 'Scrunge' program
   30 REM by David Acton
   40 REM for Archimedes only
   50 REM (c) BAU March 1990
   60 :
   70 version$="0.90"
   80 DIM q% &500,buffer% &200,iconinf%
&200,menubuf% &800,scltab% 16,mess% 68,i
c% &100,junk% &200,q2% &500
   90 DIM useful% &700,ictext% 16,icvali
d% 16
  100 DIM templates% &200,indir% &200
  110 wbcol=0:mbcol=2:wfcol=7:tfcol=7
  120 op%=-1
  130 SYS "OS_File",5,"<Scrunge$Dir>.!Sp
rites" TO ,,,,splen%
  140 DIM scrungesprites% splen%+4
  150 !scrungesprites%=splen%
  160 SYS "OS_File",255,"<Scrunge$Dir>.!
Sprites",scrungesprites%+4
  170 PROCinitheap
  180 $q%="TASK"
  190 SYS "Wimp_Initialise",200,!q%,"Scr
unge" TO version%,mytask%
  200 PROCinitflags
  210 PROCinitwindows
  220 PROCinitscrunge
  230 PROCiconbar
  240 :
  250 ON ERROR PROCerrbox
  260 :
  270 REPEAT
  280 SYS "Wimp_Poll",0,q% TO reason%
  290 CASE reason% OF
  300 WHEN 1:PROCredraw(q%)
  310 WHEN 2:SYS "Wimp_OpenWindow",,q%
  320 WHEN 3:PROCclosewindow(!q%)
  330 WHEN 4:
  340 WHEN 5:
  350 WHEN 6:PROCcheckmouse(!q%,q%!4,q%!
8,q%!12,q%!16,q%!20)
  360 WHEN 7:PROCdrag
  370 WHEN 8:IF q%!24=13 PROCdosave(FNge
tstr(savetext))
  380 WHEN 9:PROCmenuselect(q%)
  390 WHEN 17,18:PROCmessage
  400 ENDCASE
  410 UNTIL FALSE
  420 END
  430 :
  440 DEF PROCdrag
  450 dragging%=FALSE
  460 IF saving% THEN
  470 SYS "Wimp_GetPointerInfo",,q%
  480 q%!32=q%!4
  490 q%!28=!q%
  500 q%!24=q%!16
  510 q%!20=q%!12
  520 q%!16=1
  530 q%!12=0
  540 q%!36=0
  550 q%!40=0
  560 $(q%+44)=FNlastbit($savetext)+CHR$
(0)
  570 !q%=60
  580 SYS "Wimp_SendMessage",17,q%,q%!20
  590 ENDIF
  600 ENDPROC
  610 :
  620 DEF FNgetstr(a%)
  630 LOCAL b$
  640 WHILE ?a%>=32
  650 b$+=CHR$(?a%)
  660 a%+=1
  670 ENDWHILE
  680 =b$
  690 :
  700 DEF FNlastbit(s$)
  710 WHILE INSTR(s$,":")>0
  720 s$=MID$(s$,INSTR(s$,":")+1)
  730 ENDWHILE
  740 WHILE INSTR(s$,".")>0
  750 s$=MID$(s$,INSTR(s$,".")+1)
  760 ENDWHILE
  770 =s$
  780 :
  790 DEF PROCdosave(s$)
  800 LOCAL ok%
  810 IF INSTR(s$,".")<1 AND INSTR(s$,":
")<1 THEN
  820 PROCtellthemoff("To save, please d
rag the save icon to a directory viewer"
)
  830 ELSE
  840 CASE op% OF
  850 WHEN -1,0:PROCinitcomp(s$):PROCclo
semenu
  860 WHEN 1:PROCclosewindow(savehand%):
PROCexpanditem(s$)
  870 ENDCASE
  880 ENDIF
  890 ENDPROC
  900 :
  910 DEF FNtextaddr(hand%,icon%)
  920 PROCgeticoninfo(hand%,icon%)
  930 =iconinf%!28
  940 :
  950 DEF PROCgeticoninfo(hand%,icon%)
  960 !iconinf%=hand%
  970 iconinf%!4=icon%
  980 SYS "Wimp_GetIconState",,iconinf%
  990 ENDPROC
 1000 :
 1010 DEF PROCmessage
 1020 LOCAL task%,ref%
 1030 task%=q%!4
 1040 ref%=q%!8
 1050 CASE q%!16 OF
 1060 WHEN 0:PROCshutdownwimp
 1070 WHEN 2:
 1080 IF saving% THEN
 1090 PROCdosave(FNgetstr(q%+44))
 1100 saving%=FALSE
 1110 SYS "Wimp_GetPointerInfo",,q%
 1120 q%!20=q%!12
 1130 q%!24=q%!16
 1140 q%!28=!q%
 1150 q%!32=q%!4
 1160 !q%=44
 1170 q%!12=ref%
 1180 q%!16=3
 1190 q%!40=0
 1200 SYS "Wimp_SendMessage",17,q%
 1210 waitingforack%=TRUE
 1220 PROCclosemenu
 1230 ENDIF
 1240 WHEN 3:
 1250 IF q%!12=0 THEN
 1260 issf%=FALSE
 1270 f$=FNgetstr(q%+44)
 1280 SYS "OS_File",5,f$ TO type%,,ftype
%,,flen%
 1290 IF type%=1 AND flen%>=8 THEN
 1300 i$=""
 1310 in%=OPENIN(f$)
 1320 FOR i%=1 TO 8
 1330 i$+=CHR$(BGET#in%)
 1340 NEXT
 1350 CLOSE#in%
 1360 issf%=(i$="Scrunge:")
 1370 ENDIF
 1380 CASE op% OF
 1390 WHEN -1:
 1400 IF issf% THEN
 1410 op%=1
 1420 PROCupdiconbar
 1430 scrungefile$=f$
 1440 in%=OPENIN(scrungefile$)
 1450 dummy$=GET$#in%
 1460 exppoint%=PTR#in%
 1470 CLOSE#in%
 1480 MOUSE savex%,savey%,dummy%
 1490 PROCinitexpand
 1500 ELSE
 1510 PROCtellthemoff("Select 'Compact'
from menu to specify destination file")
 1520 ENDIF
 1530 WHEN 0:
 1540 SYS "Hourglass_On"
 1550 out%=OPENUP(scrungefile$)
 1560 PTR#out%=EXT#out%
 1570 PROCdoobj(f$,0)
 1580 CLOSE#out%
 1590 SYS "Hourglass_Off"
 1600 WHEN 1:PROCtellthemoff("Expansion
not yet complete - select 'Done' to abor
t")
 1610 ENDCASE
 1620 PROCloadack
 1630 ENDIF
 1640 WHEN 4:waitingforack%=FALSE
 1650 ENDCASE
 1660 ENDPROC
 1670 :
 1680 DEF PROCinitcomp(s$)
 1690 op%=0
 1700 PROCupdiconbar
 1710 scrungefile$=s$
 1720 OSCLI ("CREATE "+scrungefile$+" 0"
)
 1730 PROCclosewindow(savehand%)
 1740 ENDPROC
 1750 :
 1760 DEF PROCsendmessage(mess$)
 1770 !mess%=64
 1780 mess%!4=mytask%
 1790 mess%!8=0
 1800 mess%!12=0
 1810 mess%!16=&80EC0
 1820 $(mess%+20)=mess$
 1830 SYS "Wimp_SendMessage",17,mess%
 1840 ENDPROC
 1850 :
 1860 DEF PROCloadack
 1870 !q%=20
 1880 q%!12=ref%
 1890 q%!16=4
 1900 SYS "Wimp_SendMessage",17,q%
 1910 ENDPROC
 1920 :
 1930 DEF PROCcheckmouse(mousex%,mousey%
,b%,handle%,icon%,ob%)
 1940 IF (b% AND 5)>0 THEN
 1950 CASE handle% OF
 1960 WHEN savehand%:
 1970 CASE icon% OF
 1980 WHEN 0:PROCdosave(FNgetstr(savetex
t))
 1990 WHEN saveicon%:PROCinitsavedrag(sa
vehand%)
 2000 ENDCASE
 2010 ENDCASE
 2020 ENDIF
 2030 IF (b% AND 2)>0 THEN
 2040 CASE handle% OF
```

Continued ▶

RISC REVUE

◀ Continued

```
2050 WHEN -2:
2060 PROCmakemenus
2070 PROCopenmenu(101,mainmenu%,mousex%-86,256)
2080 ENDCASE
2090 ENDIF
2100 ENDPROC
2110 :
2120 DEF PROCmakemenus
2130 LOCAL i$,m$
2140 menuptr%=menubuf%
2150 menend%=menubuf%+&7FF
2160 mainmenu%=FNmakemen("|wininInfo,"+FNlit(op%=-1)+"Compact,"+FNlit(op%>-1)+"Done,Quit","Scrunge")
2170 IF menuptr%>menend% ERROR 17,"Insufficient Menu Space"
2180 ENDPROC
2190 :
2200 DEF FNitemname(ll%)
2210 LOCAL a%,item$
2220 a%=list%(ll%)+infosize%*fromitem%
2230 CASE ?a% OF
2240 WHEN 0:item$=$(a%!20)
2250 OTHERWISE:item$="Item "+STR$(fromitem%)
2260 ENDCASE
2270 =item$
2280 :
2290 DEF FNlit(test%)
2300 IF test% THEN ="|lit1" ELSE ="|lit0"
2310 :
2320 DEF PROCmenuitem(text$)
2330 LOCAL menuflags%,iconflags%,submenu%
2340 ii%=FALSE
2350 submenu%=-1
2360 IF text$="" ENDPROC
2370 menuflags%=0
2380 iconflags%=&07000021
2390 WHILE LEFT$(text$,1)="|"
2400 CASE MID$(text$,2,3) OF
2410 WHEN "lit":
2420 iconflags%+=(1<<22)*(1-VAL(MID$(text$,5,1)))
2430 text$=MID$(text$,6)
2440 WHEN "win":
2450 CASE MID$(text$,5,2) OF
2460 WHEN "in":submenu%=infohand%
2470 WHEN "sv":submenu%=savehand%
2480 ENDCASE
2490 text$=MID$(text$,7)
2500 ENDCASE
2510 ENDWHILE
2520 IF LEN(text$)>menumax% menumax%=LEN(text$)
2530 menuptr%!0=menuflags%
2540 menuptr%!4=submenu%
2550 menuptr%!8=iconflags%
2560 IF LEN(text$)<12 THEN
2570 $(menuptr%+12)=text$
2580 ELSE
2590 menend%-=(LEN(text$)+1)
2600 menuptr%!8=(menuptr%!8) OR %100000000
2610 menuptr%!12=menend%
2620 menuptr%!16=-1
2630 menuptr%!20=LEN(text$)
2640 $menend%=text$
2650 ENDIF
2660 menuptr%+=24
2670 ENDPROC
2680 :
2690 DEF FNpar(sep$)
2700 i1%=i%+1:i%=INSTR(menu$+sep$,sep$,i1%)
2710 =MID$(menu$,i1%,i%-i1%)
2720 :
2730 DEF FNmakemen(menu$,menutitle$)
2740 LOCAL menumax%,wasptr%
2750 wasptr%=menuptr%
2760 menumax%=10
2770 i%=0
2780 menuptr%!20=40
2790 $menuptr%=menutitle$
2800 menuptr%?12=tfcol
2810 menuptr%?13=mbcol
2820 menuptr%?14=wfcol
2830 menuptr%?15=wbcol
2840 maxaddr%=menuptr%+16
2850 menuptr%!24=0
2860 menuptr%+=28
2870 REPEAT
2880 item$=FNpar(",")
2890 PROCmenuitem(item$)
2900 UNTIL item$=""
2910 menuptr%!-24=(menuptr%!-24) OR &80
2920 !maxaddr%=menumax%*16+32
2930 =wasptr%
2940 :
2950 DEF PROCopenmenu(our%,m%,x%,y%)
2960 menuhandle%=our%
2970 menux%=x%
2980 menuy%=y%
2990 SYS "Wimp_CreateMenu",,m%,x%,y%
3000 ENDPROC
3010 :
3020 DEF PROCinitsavedrag(savehand%)
3030 LOCAL x%,y%,ysize%
3040 !q%=savehand%
3050 SYS "Wimp_GetWindowState",,q%
3060 ysize%=q%!16-q%!8
3070 x%=q%!4
3080 y%=q%!8
3090 q%!4=saveicon%
3100 SYS "Wimp_GetIconState",,q%
3110 q%!8+=x%
3120 q%!12+=y%+ysize%
3130 q%!16+=x%
3140 q%!20+=y%+ysize%
3150 q%!24=0
3160 q%!28=0
3170 q%!32=1279
3180 q%!36=1023
3190 !q%=0
3200 q%!4=5
3210 saving%=TRUE
3220 dragging%=TRUE
3230 SYS "Wimp_DragBox",,q%
3240 ENDPROC
3250 :
3260 DEF PROCopensave(t%)
3270 typetosave%=t%
3280 PROCreopen(savehand%,savex%-64,128)
3290 ENDPROC
3300 :
3310 DEF PROCiconbar
3320 $icvalid%="S!scrunge"
3330 PROCstatus
3340 !ic%=-1:ic%!4=0:ic%!8=-16:ic%!12=96+32:ic%!16=86
3350 ic%!20=%00010111000000000011000100101011
3360 ic%!24=ictext%
3370 ic%!28=icvalid%
3380 ic%!32=LEN($ictext%)+1
3390 SYS "Wimp_CreateIcon",,ic% TO scrungeicon%
3400 ENDPROC
3410 :
3420 DEF PROCupdiconbar
3430 PROCstatus
3440 !ic%=-1
3450 ic%!4=scrungeicon%
3460 ic%!8=0
3470 ic%!12=0
3480 SYS "Wimp_SetIconState",,ic%
3490 ENDPROC
3500 :
3510 DEF PROCstatus
3520 CASE op% OF
3530 WHEN -1:$ictext%="Ready"
3540 WHEN 0:$ictext%="Compact"
3550 WHEN 1:$ictext%="Expand"
3560 ENDCASE
3570 ENDPROC
3580 :
3590 DEF PROCmenuselect(menus%)
3600 LOCAL redo%
3610 SYS "Wimp_GetPointerInfo",,q2%
3620 redo%=(((q2%!8) AND 1)>0)
3630 CASE !menus% OF
3640 WHEN 1:
3650 PROCsetsaveicon("file_ffd")
3660 MOUSE savex%,savey%,dummy%
3670 $savetext="CompFile"
3680 PROCopensave(0)
3690 WHEN 2:op%=-1:PROCupdiconbar
3700 WHEN 3:PROCshutdownwimp
3710 ENDCASE
3720 IF redo% PROCmakemenus:PROCopenmenu(menuhandle%,mainmenu%,menux%,menuy%)
3730 ENDPROC
3740 :
3750 DEF PROCerrbox
3760 LOCAL buffer%
3770 op%=-1
3780 PROCupdiconbar
3790 buffer%=useful%
3800 SYS "Wimp_DragBox",,-1
3810 !buffer%=ERR
3820 $(buffer%+4)=REPORT$+" / "+STR$ERL+CHR$0
3830 SYS "Wimp_ReportError",buffer%,3,"Scrunge" TO ,what%
3840 IF what%=2 PROCshutdownwimp
3850 ENDPROC
3860 :
3870 DEF PROCshutdownwimp
3880 $q%="TASK"
3890 SYS "Wimp_CloseDown",mytask%,!q%
3900 END
3910 ENDPROC
3920 :
3930 DEF FNcreatewindow(name$)
3940 LOCAL hand%,ii%,ics%,a%
3950 SYS "Wimp_LoadTemplate",,templates%,ind%,indir%+&1FFF,-1,name$,0 TO ,,ind%
3960 IF name$<>"Save" templates%!64=scrungesprites%
3970 ics%=templates%!84
3980 IF ics%>0 AND FALSE THEN
3990 FOR ii%=0 TO ics%-1
4000 a%=templates%+88+32*ii%
4010 IF ((a%!16) AND %10)=%10 THEN
4020 a%!16=((a%!16) OR %100000000)
4030 sp$=$(a%+20)
4040 DIM a%!20 12
4050 $(a%!20)=sp$
4060 a%!24=scrungesprites%
4070 a%!28=LEN(sp$)
4080 ENDIF
4090 NEXT
4100 ENDIF
4110 SYS "Wimp_CreateWindow",,templates% TO hand%
4120 =hand%
4130 :
4140 DEF PROCreopen(hand%,x%,y%)
4150 !q%=hand%
4160 SYS "Wimp_GetWindowState",,q%
4170 workw%=q%!12-q%!4
4180 workh%=q%!16-q%!8
4190 PROCopenwindow(hand%,x%,y%,x%+workw%,y%+workh%,0,0,-1)
4200 ENDPROC
4210 :
4220 DEF PROCopenwindow(hand%,x0%,y0%,x1%,y1%,sx%,sy%,bhandle%)
4230 IF hand%<>-1 THEN
4240 q%!0=hand%:q%!28=bhandle%
4250 q%!4=x0%:q%!8=y0%:q%!12=x1%:q%!16=y1%
4260 q%!20=sx%:q%!24=sy%
4270 SYS "Wimp_OpenWindow",,q%
4280 ENDIF
4290 ENDPROC
4300 :
4310 DEF PROCclosewindow(hand%)
4320 !q%=hand%
4330 SYS "Wimp_CloseWindow",,q%
4340 ENDPROC
4350 :
4360 DEF PROCsetsaveicon(n$)
4370 LOCAL i%
4380 PROCgeticoninfo(savehand%,saveicon%)
4390 SYS "Wimp_DeleteIcon",,iconinf%
4400 IF LEN(n$)<12 n$+=CHR$(0)
4410 FOR i%=0 TO LEN(n$)-1
4420 ?(iconinf%+28+i%)=ASCMID$(n$,i%+1)
4430 NEXT
4440 iconinf%!4=savehand%
4450 SYS "Wimp_CreateIcon",,iconinf%+4 TO saveicon%
4460 ENDPROC
4470 :
4480 DEF PROCinitheap
4490 heapd%=HIMEM
4500 heapsize%=32*1024
4510 SYS "Wimp_SlotSize",-1,-1 TO appsize%
4520 SYS "Wimp_SlotSize",appsize%+heapsize%,-1
4530 SYS "OS_Heap",0,heapd%,,heapsize%
4540 ENDPROC
4550 :
4560 DEF FNgetablock(size%)
4570 LOCAL loc%,ok%,heapfull%,largest%
4580 heapfull%=FALSE
4590 REPEAT
4600 SYS "OS_Heap",1,heapd% TO ,,largest%
4610 IF largest%>=size% THEN
4620 SYS "OS_Heap",2,heapd%,,size% TO ,,loc%
4630 ok%=TRUE
4640 ELSE
4650 heafull%=FNtrytoextendheap
4660 ENDIF
4670 UNTIL ok% OR heapfull%
4680 IF heapfull% THEN ERROR 17,"Scrunge has run out of memory"
4690 =loc%
4700 :
4710 DEF FNtrytoextendheap
4720 LOCAL heapfull%,new%
4730 SYS "XWimp_SlotSize",appsize%+heapsize%+32*1024,-1 TO new%;heapfull%
4740 heapfull%=((heapfull% AND 1)=1)
4750 IF new%=appsize%+heapsize% THEN heapfull%=TRUE
4760 IF NOT heapfull% THEN
4770 heapsize%+=32*1024
4780 SYS "OS_Heap",5,heapd%,,32*1024
4790 ENDIF
4800 =heapfull%
4810 :
4820 DEF PROCfreeablock(RETURN loc%)
4830 IF loc%>0 THEN SYS "OS_Heap",3,heapd%,loc%
4840 loc%=-1
4850 ENDPROC
4860 :
4870 DEF FNlargest
4880 LOCAL largest%
4890 SYS "OS_Heap",1,heapd% TO ,,largest%
4900 =largest%
4910 :
4920 DEF PROCtellthemoff(t$)
4930 LOCAL err%
4940 err%=useful%
4950 !err%=0
4960 $(err%+4)=t$+CHR$(0)
4970 SYS "Wimp_ReportError",err%,1,"Scrunge"
4980 ENDPROC
4990 :
5000 DEF PROCinitwindows
5010 ind%=indir%
5020 SYS "Wimp_OpenTemplate",,"<Scrunge$Dir>.Templates"
5030 infohand%=FNcreatewindow("Info")
5040 savehand%=FNcreatewindow("Save")
5050 SYS "Wimp_CloseTemplate"
5060 savetext=FNtextaddr(savehand%,2)
5070 $FNtextaddr(infohand%,4)="Version "+version$
5080 saveicon%=3
5090 ENDPROC
5100 :
5110 DEF PROCinitflags
5120 saving%=FALSE
5130 dragging%=FALSE
5140 waitingforack%=FALSE
5150 filesincluded%=0
5160 wkin%=-1
5170 wkout%=-1
5180 ENDPROC
5190 :
5200 DEF PROCclosemenu
5210 SYS "Wimp_CreateMenu",,-1
5220 ENDPROC
5230 :
5240 DEF PROCinitscrunge
5250 DIM z1% &100,z2% &100,code% &1000
5260 literal%=141:comped%=142:mini%=143
5270 start=0:end=1:dest=2:destend=3
5280 read=4:byte=5:compaddr=6:longest=7
5290 byte2=8:read2=9:compaddr2=10:bestaddr=11
5300 word=12:sp=13:link=14:pc=15
5310 FOR pass%=0 TO 2 STEP 2
5320 P%=code%
5330 [OPT pass%
5340 .comp
5350 STMFD (sp)!,{dest}
5360 SUB destend,end,start
5370 ADD destend,dest,destend
5380 MOV read,start
5390 .countloop
5400 CMP dest,destend
5410 BGT finishedcomp
5420 CMP read,end
5430 BGE finishedcomp
5440 MOV longest,#0
5450 SUB compaddr,read,#255
5460 CMP compaddr,start
5470 MOVLT compaddr,start
5480 .compareloop1
5490 LDRB byte,[read]
5500 .findfirst
5510 TST compaddr,#%11
5520 BEQ words
5530 LDRB byte2,[compaddr],#1
5540 CMP byte,byte2
5550 BNE findfirst
5560 B gotfirst
5570 .words
5580 LDR word,[compaddr],#1
5590 AND byte2,word,#255
5600 CMP byte,byte2
5610 BEQ gotfirst
5620 MOV word,word,LSR #8
5630 ADD compaddr,compaddr,#1
5640 AND byte2,word,#255
5650 CMP byte,byte2
5660 BEQ gotfirst
5670 MOV word,word,LSR #8
5680 ADD compaddr,compaddr,#1
5690 AND byte2,word,#255
5700 CMP byte,byte2
5710 BEQ gotfirst
5720 ADD compaddr,compaddr,#1
5730 CMP byte,word,LSR #8
5740 BNE words
5750 .gotfirst
5760 CMP compaddr,read
5770 BGE donecomp
5780 MOV compaddr2,compaddr
5790 ADD read2,read,#1
5800 .compareloop2
5810 CMP read2,end
5820 BGE notsame
5830 CMP compaddr2,read
5840 BGE notsame
5850 LDRB byte,[read2],#1
5860 LDRB byte2,[compaddr2],#1
5870 CMP byte,byte2
5880 BEQ compareloop2
5890 .notsame
5900 SUB read2,read2,read
5910 SUB read2,read2,#1
5920 CMP read2,longest
5930 MOVGT longest,read2
5940 SUBGT bestaddr,compaddr,#1
5950 B compareloop1
5960 .donecomp
5970 SUBS longest,longest,#3
```

Continued ▶

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```
5980 BMI nohope
5990 SUB byte,read,bestaddr
6000 CMP byte,#32
6010 BGE notmini
6020 CMP longest,#8
6030 BGE notmini
6040 MOV byte2,#mini%
6050 STRB byte2,[dest],#1
6060 ADD byte2,longest,byte,ASL #3
6070 STRB byte2,[dest],#1
6080 B nextread
6090 .notmini
6100 CMP longest,#0
6110 BEQ nohope
6120 MOV byte2,#comped%
6130 STRB byte2,[dest],#1
6140 STRB byte,[dest],#1
6150 STRB longest,[dest],#1
6160 .nextread
6170 ADD read,read,longest
6180 ADD read,read,#3
6190 B countloop
6200 .nohope
6210 LDRB byte,[read],#1
6220 CMP byte,#literal%
6230 CMPNE byte,#comped%
6240 CMPNE byte,#mini%
6250 BNE notspec
6260 MOV byte2,#literal%
6270 STRB byte2,[dest],#1
6280 .notspec
6290 STRB byte,[dest],#1
6300 B countloop
6310 .finishedcomp
6320 LDMFD (sp)!,{byte}
6330 SUB R0,dest,byte
6340 MOV pc,link
6350 :
6360 .expand
6370 CMP start,end
6380 MOVGE pc,link
6390 LDRB byte,[dest],#1
6400 CMP byte,#literal%
6410 BNE notliteral
6420 LDRB byte,[dest],#1
6430 .ordinary
6440 STRB byte,[start],#1
6450 B expand
6460 .notliteral
6470 CMP byte,#comped%
6480 BNE notcomped
6490 LDRB read2,[dest],#1
6500 LDRB longest,[dest],#1
6510 B wascomped
6520 .notcomped
6530 CMP byte,#mini%
6540 BNE ordinary
6550 LDRB byte,[dest],#1
6560 AND longest,byte,#%111
6570 MOV read2,byte,LSR #3
6580 .wascomped
6590 SUB compaddr,start,read2
6600 ADD longest,longest,#3
6610 .copy
6620 LDRB byte,[compaddr],#1
6630 STRB byte,[start],#1
6640 SUBS longest,longest,#1
6650 BNE copy
6660 B expand
6670 ]
6680 NEXT pass%
6690 ENDPROC
6700 :
6710 DEF PROCdoobj(o$,depth%)
6720 LOCAL type%
6730 IF PTR#out%=0 THEN BPUT#out%,"Scru
nge: "+TIME$+"/001"
6740 SYS "OS_File",5,o$ TO type%
6750 IF type%=1 PROCdofile(o$)
6760 IF type%=2 PROCdodir(o$)
6770 ENDPROC
6780 :
6790 DEF PROCdofile(f$)
6800 LOCAL i%,wkin%,space%
6810 IF f$=scrungefile$ PROCtellthemoff
("Can't compact file to itself!"):ENDPRO
C
6820 SYS "OS_File",5,f$ TO ,,!z2%,z2%!4
,z2%!8,z2%!12
6830 BPUT#out%,1
6840 BPUT#out%,FNlastbit(f$)
6850 PROCwriteword(((!z2%) AND &FFF00)>
>8)
6860 PROCwriteblock(z2%,16)
6870 in%=OPENIN(f$)
6880 compactable%=FALSE
6890 space%=z2%!8
6900 wkin%=FNgetablock(space%+4)
6910 wkout%=FNgetablock(space%+4)
6920 SYS "OS_GBPB",4,in%,wkin%,space%
6930 compactable%=FNcount(wkin%,wkin%+s
pace%,wkout%,complen%)
6940 IF compactable% THEN
6950 BPUT#out%,1
6960 !z2%=complen%
6970 PROCwriteblock(z2%,4)
6980 PROCwriteblock(wkout%,complen%)
6990 ELSE
7000 PTR#in%=0
7010 BPUT#out%,0
7020 bytesleft%=z2%!8
7030 WHILE bytesleft%>0
7040 chunk%=space%
7050 IF chunk%>bytesleft% chunk%=bytesl
eft%
7060 SYS "OS_GBPB",4,in%,wkin%,chunk%
7070 SYS "OS_GBPB",2,out%,wkin%,chunk%
7080 bytesleft%-=chunk%
7090 ENDWHILE
7100 ENDIF
7110 PROCfreeablock(wkin%)
7120 PROCfreeablock(wkout%)
7130 CLOSE#in%
7140 filesincluded%+=1
7150 ENDPROC
7160 :
7170 DEF PROCwriteblock(base%,size%)
7180 SYS "OS_GBPB",2,out%,base%,size%
7190 ENDPROC
7200 :
7210 DEF PROCreadblock(base%,size%)
7220 SYS "OS_GBPB",4,in%,base%,size%
7230 ENDPROC
7240 :
7250 DEF PROCdodir(d$)
7260 LOCAL n%,read%,i%
7270 BPUT#out%,2
7280 BPUT#out%,FNlastbit(d$)
7290 PROCwriteword(-1)
7300 n%=0
7310 SYS "OS_GBPB",9,d$,z1%,1,n%,&100,"
*" TO ,,,read%,n%
7320 IF read%<>0 THEN
7330 WHILE n%>=0
7340 i%=0
7350 WHILE i%?z1%>0
7360 i%+=1
7370 ENDWHILE
7380 i%?z1%=13
7390 PROCdoobj(d$+"."+$z1%,depth%+1)
7400 SYS "OS_GBPB",9,d$,z1%,1,n%,&100,"
*" TO ,,,,n%
7410 ENDWHILE
7420 ENDIF
7430 BPUT#out%,3
7440 ENDPROC
7450 :
7460 DEF FNcount(A%,B%,C%,RETURN comple
n%)
7470 complen%=USR(comp)
7480 =(complen%<z2%!8)
7490 :
7500 DEF PROCinitexpand
7510 in%=OPENIN(scrungefile$)
7520 PTR#in%=exppoint%
7530 IF EOF#in% THEN
7540 op%=-1
7550 PROCupdiconbar
7560 ELSE
7570 skip%=BGET#in%
7580 $savetext=FNlastbit(GET$#in%)
7590 icontype%=FNreadword
7600 IF icontype%=-1 THEN
7610 PROCsetsaveicon("Application")
7620 ELSE
7630 PROCsetsaveicon("file_"+RIGHT$("00
"+STR$~icontype%,3))
7640 ENDIF
7650 PROCopensave(1)
7660 ENDIF
7670 CLOSE#in%
7680 ENDPROC
7690 :
7700 DEF PROCexpanditem(dir$)
7710 SYS "Hourglass_On"
7720 in%=OPENIN(scrungefile$)
7730 PTR#in%=exppoint%
7740 firstitem%=TRUE
7750 depth%=0
7760 REPEAT
7770 type%=BGET#in%
7780 CASE type% OF
7790 WHEN 1:
7800 IF firstitem% THEN
7810 throwaway$=GET$#in%
7820 f$=dir$
7830 ELSE
7840 f$=dir$+"."+GET$#in%
7850 ENDIF
7860 dummy%=FNreadword
7870 load%=FNreadword
7880 exec%=FNreadword
7890 len%=FNreadword
7900 attrib%=FNreadword
7910 compacted%=(BGET#in%=1)
7920 wkout%=FNgetablock(len%+4)
7930 IF compacted% THEN
7940 complen%=FNreadword
7950 wkin%=FNgetablock(complen%+4)
7960 PROCreadblock(wkin%,complen%)
7970 A%=wkout%
7980 B%=wkout%+len%
7990 C%=wkin%
8000 CALL expand
8010 SYS "OS_File",0,f$,,,wkout%,wkout%
+len%
8020 ELSE
8030 out%=OPENOUT(f$)
8040 bytesleft%=len%
8050 WHILE bytesleft%>0
8060 chunk%=len%
8070 IF chunk%>bytesleft% chunk%=bytesl
eft%
8080 SYS "OS_GBPB",4,in%,wkout%,chunk%
8090 SYS "OS_GBPB",2,out%,wkout%,chunk%
8100 bytesleft%-=chunk%
8110 ENDWHILE
8120 CLOSE#out%
8130 ENDIF
8140 PROCfreeablock(wkin%)
8150 PROCfreeablock(wkout%)
8160 SYS "OS_File",1,f$,load%,exec%,,at
trib%
8170 WHEN 2:
8180 IF firstitem% THEN
8190 throwaway$=GET$#in%
8200 ELSE
8210 dir$=dir$+"."+GET$#in%
8220 ENDIF
8230 dummy%=FNreadword
8240 SYS "XOS_CLI","CDIR "+dir$
8250 depth%+=1
8260 WHEN 3:
8270 dir$=FNfirstbit(dir$)
8280 depth%-=1
8290 ENDCASE
8300 firstitem%=FALSE
8310 UNTIL depth%=0
8320 exppoint%=PTR#in%
8330 CLOSE#in%
8340 SYS "Hourglass_Off"
8350 PROCinitexpand
8360 ENDPROC
8370 :
8380 DEF FNfirstbit(f$)
8390 LOCAL i%
8400 i%=LEN(f$)+1
8410 REPEAT
8420 i%-=1
8430 UNTIL i%=0 OR MID$(f$,i%,1)="."
8440 =LEFT$(f$,i%-1)
8450 :
8460 DEF FNreadword
8470 LOCAL i%
8480 FOR i%=0 TO 3
8490 i%?z2%=BGET#in%
8500 NEXT
8510 =!z2%
8520 :
8530 DEF PROCwriteword(w%)
8540 LOCAL i%
8550 !junk%=w%
8560 FOR i%=0 TO 3
8570 BPUT#out%,junk%?i%
8580 NEXT
8590 ENDPROC
```

Listing 2

```
10 REM >MakeApp (RR2)
20 REM Create 'Scrunge' files
30 REM by Dave Acton
40 REM for Archimedes only
50 REM (c) BAU March 1990
60 :
70 free%=(HIMEM-END-&8000) AND &FFFFF
000
80 DIM w% free%
90 READ app$
100 REPEAT
110 PROCins(app$)
120 INPUT"Enter destination directory:
"app$
130 IF app$="" app$="@"
140 SYS "XOS_File",5,app$ TO type%
150 UNTIL type%=2
160 REPEAT
170 READ file$
180 IF file$<>"*" THEN
190 file$=app$+"."+file$
200 PRINT"Creating file """file$""""
210 READ load%,exec%,olen%,attrib%
220 p%=0
230 d$=""
240 dl%=1
250 WHILE p%<olen%
260 b%=FNb
270 IF b%=130:p%?w%=FNb:p%+=1
280 IF b%>=131 AND b%<=162 THEN
290 n%=b%-128
300 f%=p%-FNb
310 FOR i%=0 TO n%-1
320 ?(w%+p%+i%)=?(w%+f%+i%)
330 NEXT
340 p%+=n%
350 ENDIF
360 IF b%<130 OR b%>162 THEN
370 p%?w%=b%:p%+=1
380 ENDIF
390 ENDWHILE
400 SYS "OS_File",0,file$,,,w%,w%+p%
410 SYS "OS_File",1,file$,load%,exec%,
,attrib%
420 ENDIF
430 UNTIL file$="*"
440 PRINT'"Files created"
450 END
460 :
470 DEF FNb
480 LOCAL b%,c1%,c2%,i%
490 IF d$="" THEN
500 READ d$,c1%
510 c2%=0
520 FOR i%=1 TO LEN(d$)/2
530 c2%+=EVAL("&"+MID$(d$,2*i%-1,2))
540 NEXT
550 IF c1%<>(c2% MOD 100) PRINT"Error
in DATA line ";dl%:END
560 dl%+=1
570 ENDIF
580 b%=EVAL("&"+LEFT$(d$,2))
590 d$=MID$(d$,3)
600 =b%
610 :
620 DEF PROCins(i$)
630 LOCAL i%
640 FOR i%=1 TO LEN(i$)
650 SYS "OS_Byte",138,0,ASC(MID$(i$,i%
))
660 NEXT
670 ENDPROC
680 :
690 DATA $.!SCRUNGE
700 DATA "!Boot"
710 DATA &FFFFEB42,&180F71A1
720 DATA &20,&3
730 DATA 49636F6E537072697465 73,39
740 DATA 203C4F626579244469723E,76
750 DATA 2E2187140A,44
760 DATA "!Run"
770 DATA &FFFFEB41,&EBEEED41
780 DATA &9A,&3
790 DATA 7C2053637275 6E6765200A,25
800 DATA 7C20436F7079726967 6874,9
810 DATA 20424155203139383 90A0A,19
820 DATA 536574882324446972203C,86
830 DATA 4F62657984 0A3E0A2A4963,27
840 DATA 6F6E5370726974657320 3C,59
850 DATA 8B253E2E218817 0A57696D,87
860 DATA 70536C6F74202D6D696E20,63
870 DATA 36344B830961788409 0A2A,31
880 DATA 52756E8B502E2183104 96D,36
890 DATA 61838C252A300A,5
900 DATA "!Sprites"
910 DATA &FFFFF941,&ECE16287
920 DATA &2E0,&3
930 DATA 010000010830 4E4020000,82
940 DATA D4830421736372756E6765,39
950 DATA 8317000 4871C840C078328,43
960 DATA 2C832C8083310C83347777,60
970 DATA 77778304860784 0D841482,41
980 DATA 878288828882888288830 4,34
990 DATA 8607788514770 80080 0800,77
1000 DATA 80000008836A8288862877,32
1010 DATA 778B29873C777782878008,33
1020 DATA 8529843A8650B78B297777,79
1030 DATA 7B86147B7782878694836 1,94
1040 DATA 830D83C0BBBBBB89527777,85
1050 DATA 830E86147B837B844E8288,52
1060 DATA 77B78914912885508 49B83,75
1070 DATA F1885095788 5A086C70888,96
1080 DATA A095C885F000088087DD84,6
1090 DATA F082878BEF84DE86F083F9,91
1100 DATA 850686 0B83F0FFFFFFFF83,6
1110 DATA 048607840D931484149029,94
1120 DATA 85BEF08D3E0F86D28C1588,22
1130 DATA 138C6700 8628F00F8A3E0F,6
1140 DATA F0853C847E8A88898C0F89,94
1150 DATA A4847097289450957895A0,5
1160 DATA 93C893F08F1388A0902900,77
1170 DATA "Templates"
1180 DATA &FFFFEC42,&19B24F4B
1190 DATA &341,&3
1200 DATA FFFFFFFF0000000083048 5,88
1210 DATA 074483 0D4401000018315,41
1220 DATA 7361766 50D828EF4041783,18
1230 DATA 2182888314B98718696E66,11
1240 DATA 6F0D828EFC0F08828EBF04,38
1250 DATA 843CF0020000C08334E603,42
1260 DATA 00006883 0C8850240 70000,6
1270 DATA 120003828607020701 0C0E,28
1280 DATA 0C8667FC8370058672 3D84,90
1290 DATA 7930866C8484538370206 1,30
1300 DATA 733A0D0D0D65833B00C083,26
1310 DATA 996083A1EE83A1829083A9,45
1320 DATA 3D829001C74F4B0D746974,39
1330 DATA 6C65643E0DF61083A88883,60
1340 DATA C116838 0E483C91161 0017,71
1350 DATA 3883BC84D41E83D50A8740,2
1360 DATA BA8840F1000743872084E1,25
1370 DATA 5883F9A683 60829883FFEC,65
1380 DATA 83683A6000176170706C69,46
1390 DATA 636174696F6E0D829A83F8,14
1400 DATA 08838 04A83FC3884806000,36
1410 DATA D73C556E8880E64484CFFE,25
1420 DATA FFFFF483F32C93206E83F2,34
1430 DATA 0C848C83E13C934046696C,94
1440 DATA 65206E616D6583F222842C,33
1450 DATA 83D0829E84CC83D883FF84,28
1460 DATA 05002007000012000382 84,27
1470 DATA 0702070 10C0E0C8619FC83,97
```

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RISC REVUE

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```
1480 DATA C00586243D842C300084CF,91
1490 DATA 85357887E01383FC0983F8,55
1500 DATA A4835034830FC5403000064,97
1510 DATA 84C43000B70D4B0D88C4FE,46
1520 DATA 84E4CC83FC768378835784,66
1530 DATA E4075363727 56E67650D72,89
1540 DATA 20490D842082988720C884,63
1550 DATA E461000782888 7641A83F8,41
1560 DATA 844084588440829487 2082,87
1570 DATA A287842887203087606087,46
1580 DATA 40B887A41E83F43E83F8D0,1
1590 DATA 83B18488F883B919000017,88
1600 DATA 4E616D653A0D86A00E83F2,37
1610 DATA 829C8720C4872050757270,39
1620 DATA 6F73832383C08444688740,18
1630 DATA 8290874041757 4686F723A,58
1640 DATA 0D88403887608480846056,74
1650 DATA 657273696F6E854041626F,27
1660 DATA 75742074686973207 0726F,74
1670 DATA 6772616D0D46696C652043,19
1680 DATA 6F6D7061637483272053 79,50
1690 DATA 7374656D0DA9204242432 0,86
1700 DATA 41636F726E2055736572 20,78
1710 DATA 313938390D0D,45
1720 DATA *
```

Listing 3

```
10 REM >Rippler (RR3)
20 REM by Stuart Cupit
30 REM for Archimedes only
40 REM (c) BAU March 1990
50 :
60 MODE 13
70 MOUSE TO 0,0
80 PRINT TAB(4,10)"Please wait....."
90 max=7
100 speed=2
110 anginc=PI/32
120 angle=0
130 memory=0
140 amp=speed/100
150 size=8*(max/(speed/100))
160 DIM table size+4
170 DIM variables 12
180 :
190 PROCassemble
200 :
210 REPEAT
220 !(table+memory)=amp*SIN(angle)
230 memory+=4
240 angle+=anginc
250 amp+=speed/100
260 IF amp>max speed=speed*-1
270 UNTIL amp<=0
280 :
290 *FX 112,2
300 *FX 113,2
310 CLS
320 !(variables)=149
330 !(variables+4)=-1
340 SYS"OS_ReadVduVariables",variables
,variables
350 !(info+4)=!(variables)
360 PRINT TAB(4,10)"Load screen? (Y/N)
";:k$=GET$
370 IF k$="Y" OR k$="y" INPUT TAB(4,12
)"Enter file name ";name$:OSCLI("SCREENL
OAD "+name$) ELSE PROCsimple
380 *FX 112,1
390 *FX 113,1
400 :
410 !(variables)=149
420 !(variables+4)=-1
430 SYS"OS_ReadVduVariables",variables
,variables
440 !(info)=!(variables)
450 !(info+8)=!(info)+&14000
460 !(info+12)=table
470 !(info+16)=0
480 !(info+20)=table+size
490 !(info+24)=!(info+4)+&14000
500 !(info+28)=(size DIV 4)-1
510 :
520 REPEAT
530 CALL ripple
540 REPEAT
550 MOUSE xpos,ypos,buttons
560 UNTIL buttons=0
570 FOR delay=1 TO ypos/100
580 WAIT
590 NEXT delay
600 UNTIL FALSE
610 END
620 :
630 DEF PROCassemble
640 DIM code 10000
650 FOR pass%=0 TO 2 STEP 2
660 P%=code
670 [OPT pass%
680 .ripple
690 STMFD R13!,{R14}
700 ADR R12,info
710 LDR R11,[R12]
720 LDR R10,[R12,#4]
730 LDR R9,[R12,#24]
740 LDR R8,[R12,#12]
750 :
760 LDR R7,[R12,#16]
770 LDR R6,[R12,#28]
780 ADD R7,R7,#1
790 CMP R7,R6
800 MOVGE R7,#0
810 STR R7,[R12,#16]
820 ADD R8,R8,R7,ASL #2
830 LDR R6,[R12,#20]
840 :
850 .anoter_line
860 MOV R7,R10
870 LDR R5,[R8],#4
880 CMP R8,R6
890 LDRGE R8,[R12,#12]
900 MOV R4,#320
910 MLA R7,R4,R5,R7
920 CMP R7,R9
930 ADDGE R11,R11,#320
940 BGE overlap
950 LDR R4,[R12,#4]
960 CMP R7,R4
970 ADDLT R11,R11,#320
980 BLT overlap
990 ]
1000 :
1010 FOR block=1 TO 16
1020 [OPT pass%
1030 LDMIA R7!,{R0-R4}
1040 STMIA R11!,{R0-R4}
1050 ]
1060 NEXT block
1070 :
1080 [OPT pass%
1090 .overlap
1100 ADD R10,R10,#320
1110 LDR R0,[R12,#8]
1120 CMP R11,R0
1130 BLT anoter_line
1140 LDMFD R13!,{PC}
1150 :
1160 .info
1170 EQUD 0:EQUD 0:EQUD 0:EQUD 0
1180 EQUD 0:EQUD 0:EQUD 0
1190 ]
1200 NEXT pass%
1210 ENDPROC
1220 :
1230 DEF PROCsimple
1240 CLS
1250 FOR loop=1 TO 30
1260 GCOL RND(64) TINT RND(256)
1270 CIRCLE FILL RND(1279),RND(1024),RN
D(400)
1280 GCOL RND(64) TINT RND(256)
1290 MOVE RND(1279),RND(1024)
1300 PLOT 85,RND(1279),RND(1024)
1310 NEXT loop
1320 PRINT TAB(2,5)" 'Rippler' Mode 13
screen rippler"
1330 PRINT TAB(10,7)" by Stuart Cupit "
1340 ENDPROC
```

RISCOS SKELETON

Listing 1

```
10 REM >CreateT
20 REM Create templates file
30 REM by Jason O'Broin/Dave Acton
40 REM for Archimedes only
50 REM (c) BAU March 1990
60 :
70 free%=(HIMEM-END-&8000) AND &FFFFF
000
80 DIM w% free%
90 READ app$
100 REPEAT
110 PROCins(app$)
120 INPUT"Enter destination directory:
"app$
130 IF app$="" app$="@"
140 SYS "XOS_File",5,app$ TO type%
150 UNTIL type%=2
160 REPEAT
170 READ file$
180 IF file$<>"*" THEN
190 file$=app$+"."+file$
200 PRINT"Creating file """file$""""
210 READ load%,exec%,olen%,attrib%
220 p%=0
230 d$=""
240 dl%=1
250 WHILE p%<olen%
260 b%=FNb
270 IF b%=130:p%?w%=FNb:p%+=1
280 IF b%>=131 AND b%<=162 THEN
290 n%=b%-128
300 f%=p%-FNb
310 FOR i%=0 TO n%-1
320 ?(w%+p%+i%)=?(w%+f%+i%)
330 NEXT
340 p%+=n%
350 ENDIF
360 IF b%<130 OR b%>162 THEN
370 p%?w%=b%:p%+=1
380 ENDIF
390 ENDWHILE
400 SYS "OS_File",0,file$,,,w%,w%+p%
410 SYS "OS_File",1,file$,load%,exec%,
,attrib%
420 ENDIF
430 UNTIL file$="*"
440 PRINT'"Files created"
450 END
460 :
470 DEF FNb
480 LOCAL b%,c1%,c2%,i%
490 IF d$="" THEN
500 READ d$,c1%
510 c2%=0
520 FOR i%=1 TO LEN(d$)/2
530 c2%+=EVAL("&"+MID$(d$,2*i%-1,2))
540 NEXT
550 IF c1%<>(c2% MOD 100) PRINT"Error
in DATA line ";dl%:END
560 dl%+=1
570 ENDIF
580 b%=EVAL("&"+LEFT$(d$,2))
590 d$=MID$(d$,3)
600 =b%
610 :
620 DEF PROCins(i$)
630 LOCAL i%
640 FOR i%=1 TO LEN(i$)
650 SYS "OS_Byte",138,0,ASC(MID$(i$,i%
))
660 NEXT
670 ENDPROC
680 :
690 DATA $.!BAUsetup
700 DATA "Templates"
710 DATA &FFFFEC41,&F223A1F3
720 DATA &675,&3
730 DATA FFFFFFFF0000000830485,88
740 DATA 0744830DAF010000018315,48
750 DATA 696E666F0DF0828FE0F849,99
760 DATA 0000F383148282048 6186D,25
770 DATA 61696E0D1B0000F01F863A,15
780 DATA 6883308831B007203000 0D4,70
790 DATA 8B4D2407000012000782 84,46
800 DATA 07020701 0C0E0C85673083,70
810 DATA 710A0286723D8465837D86,57
820 DATA 07000078837884901383 91,49
830 DATA 098395829A8399CC83A102,55
840 DATA 8330FC83A93D000007436F,77
850 DATA 6E666967757265 0D862082,61
860 DATA 988720C8842001000782 8B,60
870 DATA 874415874068874082948 7,39
880 DATA 20829E87641487603487 60,89
890 DATA 648740AE8B403E83ECD083,44
900 DATA B08488F883B8190000174E,33
910 DATA 616D653A0D6C65643E0DFE,16
920 DATA 0E83FF829C8720C4872050,96
930 DATA 7572706F738323832 01E87,63
940 DATA 8084C8829087404175 7468,35
950 DATA 6F723A0D884038876060 87,14
960 DATA 6056657273696F6E8540A4,99
970 DATA 83F884A0540387A03080B7,12
980 DATA 4F4B0D746974868041626F,40
990 DATA 75742074686973207 0726F,74
1000 DATA 6772616D0D436F6E666967,34
1010 DATA 757265732060616368696E,3
1020 DATA 650DA9204A61736F6E204F,33
1030 DATA 2742726F696E0D0D4683FB,23
1040 DATA F483E7829083 57D4835B83,63
1050 DATA EA84050028070000 1F0007,56
1060 DATA 7F0702070103010C851920,50
1070 DATA FEFFFF4A87243D842B3000,93
1080 DATA 00833B8535896C0D0D6520,80
1090 DATA 842C83EFB883EFDC83F7E8,30
1100 DATA 83F739300017426175 6420,18
1110 DATA 52617465 0D3A0DEE87204A,59
1120 DATA 837C84203D3100075804 00,28
1130 DATA 0083FAFF06839422839882,68
1140 DATA 8483EFD283A0B487404461,47
1150 DATA 74610D836083EF7F844084,78
1160 DATA 202C83BCB0874059874002,60
1170 DATA 83D42483D84C8380D483E0,28
1180 DATA 7C8480600017 4C616E6775,6
1190 DATA 6167650D8740842084408 4,5
1200 DATA 208480 5A878084E32683F2,15
1210 DATA 1483C0D683FA44874040 6F,93
1220 DATA 64650D746C8980842 08480,27
1230 DATA 842084C05B8B402A83F8E0,27
1240 DATA FEFFFFDA83E810878 04472,6
1250 DATA 6976650D8A40DC832084C0,46
1260 DATA 0C87C05C8FC0A8834084C0,53
1270 DATA D8834884C0466C6F707069,61
1280 DATA 657388C0842084C0D48368,79
1290 DATA 84C05D8B4084C074838084,51
1300 DATA C0A48740486172642 04469,43
1310 DATA 736B7386C0842084C082A0,41
1320 DATA 87405E8B800C83F84083C0,38
1330 DATA D883E870848061000175F87,1
1340 DATA E00D83FC84C0842084C06C,40
1350 DATA 87806C8BC082A283D8B883,56
1360 DATA F85E83CDE883E084C04144,22
1370 DATA 4653627566666572730D7A,37
1380 DATA 83E5BC83F82A03000 0EC83,39
1390 DATA F584C06D87C083C7854080,60
1400 DATA 83CD6E83CDB0844083806E,23
1410 DATA 8B808440828487408487 40,3
1420 DATA 7B8B40829083D84C83CD40,23
1430 DATA 83CD7C8780466F6E745369,18
1440 DATA 7A650D3E0D7F848084208 4,94
1450 DATA 80842084C07C87E00583FC,87
1460 DATA 829883D81483ED4883CD44,93
1470 DATA 87C052616D467385418640,96
1480 DATA 842084C0842084C07D8B40,4
1490 DATA 828883C0DCFEFFFF3883E8,92
1500 DATA 0C88404D41857F64878084,9
1510 DATA 2084C0842084C07E8B8082,67
1520 DATA 9E83C0A483404E83E8D483,24
1530 DATA 4884C053637265656E85C2,31
1540 DATA 85C0A887408420 84C07F8F,50
1550 DATA 406C87408 29C8840707269,88
1560 DATA 74658A40748780 82A08740,87
1570 DATA 808F80388780688880 7973,22
1580 DATA 74656D8A804087C0846884,51
1590 DATA C08187C083C7000D0D0D0D,30
1600 DATA 83044D6F6E69746F722054,95
1610 DATA 7970658313414446534469,43
1620 DATA 7243616368840F84250D,10
1630 DATA *
```

Listing 2

```
10 REM >!RunImage
20 REM Easy configure program for Arc
30 REM by Jason O'Broin
40 REM for Arc only
50 REM (c) BAU March 1989
60 :
70 REM Lines 3140 are specific
80 REM to !BAUconfig.
90 REM Other lines make reference
100 REM to !BAUconfig and should be
110 REM altered accordingly for
120 REM your own programs.
130 :
140 ON ERROR PROCerror
150 PROCsetup
160 PROCget_cmos
170 PROCmain
180 PROCfinish
190 END
200 :
210 DEF PROCsetup
220 alias$="<BAUsetup$Dir>"
230 version$="1.08 - 6-Oct-89"
240 DIM q% 100, block% 1000,menblk% 10
00
250 DIM main_blk% 1000
260 DIM load% 100,save% 100
270 DIM load_dat% 255, save_dat% 255
280 max_cmos=15:DIM cmosb(max_cmos,3)
290 $q%="TASK"
300 SYS "Wimp_Initialise",200,!q%,"BAU
setup" TO ,handle%
310 PROCsprites(alias$+".!Sprites")
320 iconh%=FNiconbar("!BAUsetup")
```

Continued ▶

RISCOS SKELETON

◀ Continued

```
330 info%=FNtemplates(alias$+".Templates")
340 PROCset_version(info%,3,version$)
350 PROCload_menus
360 ENDPROC
370 :
380 DEF PROCload_menus
390 lm%=OPENIN(alias$+".Menu")
400 dim%=EXT#lm%
410 CLOSE#lm%
420 DIM menu_data% dim%
430 OSCLI "LOAD "+alias$+".Menu "+STR$~(menu_data%)
440 current_menu$=""
450 ENDPROC
460 :
470 DEF PROCmain
480 REPEAT
490 PROCpoll(%1001111111011011 0011)
500 UNTIL (reason%=17 OR reason%=18) AND block%!16=0
510 ENDPROC
520 :
530 DEF FNiconbar(spname$)
540 !block%=-1
550 block%!4=0
560 block%!8=0
570 block%!12=63
580 block%!16=64
590 block%!20=&2102
600 DIM block%!24 (LENspname$+1)
610 $(block%!24)=spname$
620 block%!28=sprite%
630 block%!32=(LENspname$+1)
640 SYS "Wimp_CreateIcon",,block% TO icon%
650 =icon%
660 :
670 DEF PROCsprites(file$)
680 sp=OPENIN(file$)
690 dim%=EXT#sp+16
700 CLOSE#sp
710 DIM sprite% dim%
720 !sprite%=dim%
730 sprite%!4=0
740 sprite%!8=16
750 sprite%!12=16
760 SYS "OS_SpriteOp",256+10,sprite%,file$
770 ENDPROC
780 :
790 DEF PROCpoll(mask%)
800 !block%=mask%
810 SYS "Wimp_Poll",0,block% TO reason%
820 IF reason% PROCaction(reason%)
830 ENDPROC
840 :
850 DEF PROCaction(reason%)
860 CASE reason% OF
870 WHEN 2 : PROCopen
880 WHEN 3 : PROCclose
890 WHEN 6 : PROCcheck_mouse(!block%,block%!4,block%!8,block%!12)
900 WHEN 9 : PROCmenu_select
910 ENDCASE
920 ENDPROC
930 :
940 DEF PROCcheck_mouse(mx%,my%,but%,hnd%)
950 CASE but% OF
960 WHEN 2 : IF hnd%=-2 THEN
970 PROCcreate_icon_menu("BAUsetup",mx%)
980 ELSE
990 PROCcreate_menu("Main",mx%,my%)
1000 ENDIF
1010 WHEN 4 : CASE hnd% OF
1020 WHEN -2 : PROCcreate_window
1030 WHEN main% : PROCinc_icon(1)
1040 ENDCASE
1050 WHEN 1 : CASE hnd% OF
1060 WHEN main% : PROCinc_icon(-1)
1070 ENDCASE
1080 ENDCASE
1090 ENDPROC
1100 :
1110 DEF PROCcreate_menu(title$,x%,y%)
1120 menuy%=y%
1130 PROCbuild_menu(title$,menuy%)
1140 menux%=x%-64
1150 menuy%=y%
1160 SYS "Wimp_CreateMenu",,blk%,menux%,menuy%
1170 ENDPROC
1180 :
1190 DEF PROCcreate_icon_menu(title$,x%)
1200 menuy%=0
1210 PROCbuild_menu(title$,menuy%)
1220 menux%=x%-64
1230 SYS "Wimp_CreateMenu",,blk%,menux%,menuy%
1240 ENDPROC
1250 :
1260 DEF PROCbuild_menu(title$,RETURN height%)
1270 LOCAL offset%,i%,menuItems%,dots%,wimpflags,flags,ptr%,name$,ptr$
1280 offset%=FNfind_menu(title$,menu_data%)
1290 IF offset%=TRUE THEN ERROR 42,"Can't find menu data"
1300 blk$=FNget_menu_item(menu_data%,offset%)
1310 blk%=EVAL(blk$)
1320 $blk%=LEFT$(title$,12)
1330 blk%?12=7
1340 blk%?13=2
1350 blk%?14=7
1360 blk%?15=0
1370 blk%!16=172
1380 blk%!20=44
1390 blk%!24=0
1400 i%=28
1410 menuItems%=0
1420 dots%=0
1430 WHILE menu_data%?offset%<>ASC"~" AND menu_data%?offset%<>ASC"^"
1440 PROCmenu_item
1450 IF RIGHT$(name$,1)="@" THEN name$=LEFT$(name$,LENname$-1):ptr$=FNbuild_submenu(name$,pos%)
1460 IF (flags AND 4)=4 THEN
1470 instr%=INSTR(ptr$,",")
1480 blk%!(i%+12)=EVAL(LEFT$(ptr$,instr%-1))
1490 ptr$=MID$(ptr$,instr%+1)
1500 instr%=INSTR(ptr$,",")
1510 blk%!(i%+16)=EVAL(LEFT$(ptr$,instr%-1))
1520 ptr$=MID$(ptr$,instr%+1)
1530 blk%!(i%+20)=EVAL(ptr$)
1540 wimpflags=wimpflags OR 2^8
1550 ptr%=-1
1560 $(blk%!(i%+12))=LEFT$(name$,blk%!(i%+20))
1570 ELSE
1580 $(blk%+i%+12)=LEFT$(name$,12)
1590 ptr%=EVAL(ptr$)
1600 ENDIF
1610 blk%!i%=flags
1620 blk%!(i%+4)=ptr%
1630 blk%!(i%+8)=wimpflags
1640 i%=i%+24
1650 menuItems%+=1
1660 ENDWHILE
1670 height%=96+(menuItems%*44)+(dots%*24)
1680 current_menu$=LEFT$($blk%,12)
1690 ENDPROC
1700 :
1710 DEF PROCmenu_item
1720 wimpflags=&7000021
1730 flags=0
1740 ptr$="-1"
1750 func$=""
1760 name$=FNget_menu_item(menu_data%,offset%)
1770 IF menu_data%?offset%=ASC"!" offset%+=1:ptr$=FNget_menu_item(menu_data%,offset%)
1780 IF menu_data%?offset%=ASC"{" offset%+=1:wimpflags=EVAL(FNget_menu_item(menu_data%,offset%))
1790 IF menu_data%?offset%=ASC"\" offset%+=1:func$=FNget_menu_item(menu_data%,offset%)
1800 IF menu_data%?offset%=ASC"~" OR menu_data%?offset%=ASC"^" flags=flags OR &80
1810 IF LEFT$(name$,1)="}" THEN flags+=1:name$=MID$(name$,2)
1820 IF LEFT$(name$,1)="#" THEN flags+=4:name$=MID$(name$,2)
1830 IF RIGHT$(name$,1)="}" THEN flags+=2:name$=LEFT$(name$,LENname$-1):dots%+=1
1840 ENDPROC
1850 :
1860 DEF FNbuild_submenu(title$,pos%)
1870 LOCAL blk$,blk%
1880 PROCbuild_menu(title$,pos%)
1890 =blk$
1900 :
1910 DEF PROCmenu_select
1920 SYS "Wimp_GetPointerInfo",,q%
1930 but%=q%!8
1940 depth%=0
1950 PROCdecode_menu(current_menu$)
1960 IF (but% AND 1)=1 THEN
1970 PROCre_openmenu(current_menu$,menux%,menuy%)
1980 ELSE
1990 current_menu$=""
2000 ENDIF
2010 ENDPROC
2020 :
2030 DEF PROCre_openmenu(title$,menx%,meny%)
2040 offset%=FNfind_menu(title$,menu_data%)
2050 blk%=EVAL(FNget_menu_item(menu_data%,offset%))
2060 SYS "Wimp_CreateMenu",,blk%,menx%,meny%
2070 current_menu$=title$
2080 ENDPROC
2090 :
2100 DEF PROCdecode_menu(title$)
2110 LOCAL men_loop%,func$
2120 offset%=FNfind_menu(title$,menu_data%)
2130 blk%=EVAL(FNget_menu_item(menu_data%,offset%))
2140 men_loop%=0
2150 WHILE men_loop%<=block%!depth%
2160 dots%=0
2170 PROCmenu_item
2180 men_loop%+=1
2190 ENDWHILE
2200 IF block%!depth%>-1 THEN
2210 IF RIGHT$(name$,1)="@" THEN
2220 name$=LEFT$(name$,LENname$-1)
2230 depth%+=4
2240 PROCdecode_menu(name$)
2250 ENDIF
2260 IF func$<>"" THEN a=EVAL("FN"+func$)
2270 ENDIF
2280 ENDPROC
2290 :
2300 DEF FNtemplates(file$)
2310 DIM Q% 2048, P% 2048
2320 maxws%=&100
2330 DIM indir% maxws%, indir2% maxws%
2340 SYS "Wimp_OpenTemplate",,file$
2350 SYS "Wimp_LoadTemplate",,Q%,indir%,indir%+maxws%,-1,"info",0
2360 SYS "Wimp_LoadTemplate",,P%,indir2%,indir2%+maxws%,-1,"main",0
2370 SYS "Wimp_CreateWindow",,Q% TO info%
2380 SYS "Wimp_CreateWindow",,P% TO main%
2390 SYS "Wimp_CloseTemplate"
2400 =info%
2410 :
2420 DEF PROCset_version(pt%,H%,ver$)
2430 !q%=pt%
2440 q%!4=H%
2450 SYS"Wimp_GetIconState",,q%
2460 $q%!28=ver$
2470 q%!8=0
2480 q%!12=0
2490 SYS "Wimp_SetIconState",,q%
2500 ENDPROC
2510 :
2520 DEF PROCfinish
2530 SYS "Wimp_CloseDown",handle%,!q%
2540 END
2550 ENDPROC
2560 :
2570 DEF PROCerror
2580 SYS "Wimp_DragBox",,0
2590 !block%=ERR
2600 error=TRUE
2610 CASE ERR OF
2620 WHEN 222 : $(block%+4)="This file does not exist"+CHR$0:error=FALSE
2630 OTHERWISE
2640 $(block%+4)="(Internal error code "+STR$(ERL)+") "+REPORT$+CHR$0
2650 ENDCASE
2660 flags=1
2670 SYS "Wimp_ReportError",block%,flags,"BAUsetup"
2680 IF error THEN PROCfinish ELSE PROCmain:END
2690 ENDPROC
2700 :
2710 DEF PROCcreate_window
2720 !block%=main%
2730 block%!4=300
2740 block%!8=300
2750 block%!12=1142
2760 block%!16=780
2770 block%!20=0
2780 block%!24=0
2790 block%!28=-1
2800 SYS "Wimp_OpenWindow",,block%
2810 ENDPROC
2820 :
2830 DEF PROCclose
2840 SYS "Wimp_CloseWindow",,block%
2850 ENDPROC
2860 :
2870 DEF PROCopen
2880 SYS "Wimp_OpenWindow",,block%
2890 ENDPROC
2900 :
2910 DEF FNget_menu_item(db%,RETURN off%)
2920 LOCAL st$
2930 WHILE db%?off%<>10 AND db%?off%<>13
2940 st$+=CHR$(db%?off%)
2950 off%+=1
2960 ENDWHILE
2970 off%+=1
2980 =st$
2990 :
3000 DEF FNfind_menu(name$,data%)
3010 LOCAL fi$
3020 name$="^"+name$
3030 offset%=0
3040 REPEAT
3050 fi$=FNget_menu_item(data%,offset%)
3060 UNTIL fi$=name$ OR fi$="~"
3070 IF fi$="~" THEN =TRUE
3080 =offset%
3090 :
3100 DEF FNfin
3110 PROCfinish
3120 =0
3130 :
3140 REM The routines for !BAUsetup follow
3150 :
3160 DEF PROCinc_icon(inc)
3170 icon%=block%!16
3180 IF (icon% MOD 2)=1 THEN icon%-=1
3190 IF icon%<0 THEN ENDPROC
3200 icon%=icon%/2
3210 IF icon%>15 THEN ENDPROC
3220 cmosb(icon%,3)=cmosb(icon%,3)+inc
3230 IF cmosb(icon%,3)<0 THEN
3240 IF icon%=3 THEN cmosb(icon%,3)=31 ELSE cmosb(icon%,3)=cmosb(icon%,1)
3250 ENDIF
3260 IF icon%=3 THEN
3270 cmosb(icon%,3)=cmosb(icon%,3) AND 31
3280 ELSE
3290 cmosb(icon%,3)=cmosb(icon%,3) AND cmosb(icon%,1)
3300 ENDIF
3310 SYS "OS_Byte",&A1,cmosb(icon%,0) TO ,,value
3320 SYS "OS_Byte",&A2,cmosb(icon%,0),(value AND (255-(cmosb(icon%,1)<<cmosb(icon%,2))))+((cmosb(icon%,3) AND cmosb(icon%,1)) << cmosb(icon%,2))
3330 IF icon%=3 THEN
3340 SYS "OS_Byte",&A1,133 TO ,,top
3350 z=cmosb(icon%,3) >>4
3360 z=z << 1
3370 top=top AND 253
3380 top=top OR z
3390 SYS "OS_Byte",&A2,133,top
3400 ENDIF
3410 PROCset_values(icon%)
3420 ENDPROC
3430 :
3440 DEF PROCget_cmos
3450 RESTORE
3460 FOR cmos=0 TO max_cmos
3470 READ cmosb(cmos,0),cmosb(cmos,1),cmosb(cmos,2)
3480 SYS "OS_Byte",&A1,cmosb(cmos,0) TO ,,value
3490 value=(value >> cmosb(cmos,2)) AND cmosb(cmos,1)
3500 IF cmos=3 THEN
3510 SYS "OS_Byte",&A1,133 TO ,,top
3520 top=top >> 1
3530 value=(top<<4)+value
3540 ENDIF
3550 cmosb(cmos,3)=value
3560 PROCset_values(cmos)
3570 NEXT
3580 ENDPROC
3590 :
3600 DEF PROCset_values(cmos)
3610 value=cmosb(cmos,3)
3620 IF cmos=0 THEN
3630 baud$="   75  150  300 1200 2400 4800 960019200"
3640 value=VAL(MID$(baud$,(value*5)+1,5))
3650 ENDIF
3660 IF cmos=10 THEN value=value*4
3670 IF cmos>=11 AND cmos<=15 THEN value=value*8
3680 PROCset_version(main%,(cmos*2)+1,STR$(value))
3690 ENDPROC
3700 :
3710 DATA 15,7,2
3720 DATA 16,7,5
3730 DATA 185,255,0
3740 DATA 10,15,0
3750 DATA 11,7,0
3760 DATA 135,7,0
3770 DATA 135,7,3
3780 DATA 133,3,3
3790 DATA 137,255,0
3800 DATA 199,255,0
3810 DATA 134,255,0
3820 DATA 144,127,0
3830 DATA 146,127,0
3840 DATA 143,127,0
3850 DATA 147,127,0
3860 DATA 145,63,0
3870 :
3880 DEF FNload
3890 file=OPENIN($load_dat%)
3900 FOR loop=1 TO 255
3910 IF loop=128 THEN loop=132
3920 value=BGET#file
3930 SYS "OS_Byte",&A2,loop,value
3940 NEXT
3950 CLOSE#file
3960 PROCget_cmos
```

Continued ▶

RISCOS SKELETON

◀ Continued

```
3970 =Ø
3980 :
3990 DEF FNsave
4000 file=OPENOUT($save_dat%)
4010 FOR loop=1 TO 255
4020 IF loop=128 THEN loop=132
4030 SYS "OS_Byte",&A1,loop TO ,,value
4040 BPUT#file,value
4050 NEXT
4060 CLOSE#file
4070 =Ø
```

Listing 3

```
| > !Run
| !Run file for !BAUsetup program
wimpslot -min 3Øk -max 3Øk
set BAUsetup$dir <obey$dir>
<obey$dir>.!RunImage
```

Listing 4

```
^BAUsetup
menblk%
Info}
!info%
Quit
\fin
^Main
main_blk%
Load@
\load
Save@
\save
^Load
load%
#BAUsetup
!load_dat%,-1,255
\load
^Save
save%
#BAUsetup
!save_dat%,-1,255
\save
~
```

COBOL

Listing 1

```
10 REM Small COBOL Package Menu
20 REM by Jeff Morgan
25 REM for B/B+/M/C
30 REM (c) BAU March 199Ø
40 :
50 MODE 7
60 ON ERROR PROCerror
70 PROCinit
80 PROCcreate_compiler_file
90 PROCmenu
100 PROCchoice
110 END
120 :
130 DEF PROCinit
140 DIM menu$(3)
150 DIM table$(1ØØ),error$(1ØØ)
160 DIM state%(1ØØ),order%(1ØØ)
170 compiler$="CDATA"
180 *FX12,4
190 VDU3:CLOSE#Ø:VDU 23;1Ø;Ø;Ø;Ø;
200 ENDPROC
210 :
220 DEF FNthere(file$)
230 LOCAL ch%
240 ch%=OPENUP(file$):CLOSE#ch%
250 =(ch%=17)
260 :
270 DEF PROCmenu
280 LOCAL i%,y%
290 CLS:RESTORE 132Ø
300 PROChead("Small COBOL Package Menu")
310 PRINT TAB(Ø,23);CHR$(132);CHR$(157);CHR$(131);CHR$(131);
320 FOR i%=1 TO 3
330 y%=(i%*4)+2
340 READ menu$(i%)
350 PRINT TAB(8,y%);CHR$(141);i%;") ";menu$(i%);TAB(8,y%+1);CHR$(141);i%;") ";menu$(i%)
360 NEXT
370 ENDPROC
380 :
390 DEF PROCchoice
400 LOCAL choice%,a$
410 PRINT TAB(6,19);CHR$(141);"Enter your choice (1-3) ";
420 PRINT TAB(6,2Ø);CHR$(141);"Enter your choice (1-3) ";
430 REPEAT
440 choice%=GET-48
450 UNTIL choice%>Ø AND choice%<4
460 PRINT TAB(31,19);choice%;TAB(31,2Ø);choice%;
470 IF choice%=3 THEN GOTO 5ØØ
480 a$="LOADING "+menu$(choice%)
490 PRINT TAB((36-LEN(a$)) DIV 2,23);a$;
500 ON choice% GOTO 51Ø,52Ø,53Ø
510 PAGE=&13ØØ:CHAIN "COMPILE"
520 CHAIN "RUNTIME"
530 CLS:PRINT"BYE!":END
540 ENDPROC
550 :
560 DEF PROChead(a$)
570 CLS
580 PRINT TAB(Ø,1);CHR$(132);CHR$(157);CHR$(131);CHR$(141);TAB((39-LEN(a$)) DIV 2);a$
590 PRINT TAB(Ø,2);CHR$(132);CHR$(157);CHR$(131);CHR$(141);TAB((39-LEN(a$)) DIV 2);a$
600 ENDPROC
610 :
620 DEF PROCerror
630 VDU 3
640 CLOSE#Ø
650 VDU23,1,1;Ø;Ø;Ø;
660 IF ERR=17 THEN RUN ELSE CLS:REPORT:PRINT" at line ";ERL
670 END
680:
690 DEF PROCcreate_compiler_file
700 IF FNthere(compiler$) THEN ENDPROC
710 PRINT'"Creating compiler datafile,"'
720 PROClexicon
730 PROCmessages
740 PROCstatements
750 PROCsave_compiler_file
760 PRINT'"done.":PROCspace
770 ENDPROC
780:
790 DEF PROClexicon
800 LOCAL i%,key$
810 RESTORE 135Ø
820 i%=Ø
830 REPEAT
840 READ key$
850 IF key$<>"*" THEN i%=i%+1:table$(i%)=key$
860 UNTIL key$="*"
870 keyend%=i%
880 ENDPROC
890:
900 DEF PROCmessages
910 LOCAL i%,err$
920 RESTORE 141Ø
930 i%=Ø
940 REPEAT
950 READ err$
960 IF err$<>"*" THEN i%=i%+1:error$(i%)=err$
970 UNTIL err$="*"
980 message%=i%
990 ENDPROC
1000:
1010 DEF PROCstatements
1020 LOCAL i%,state%
1030 RESTORE 147Ø
1040 i%=Ø
1050 REPEAT
1060 READ state%
1070 IF state%<>-1 THEN i%=i%+1:order%(i%)=state%
1080 UNTIL state%=-1
1090 statements%=i%
1100 ENDPROC
1110:
1120 DEF PROCsave_compiler_file
1130 LOCAL i%,ch%
1140 ch%=OPENOUT(compiler$)
1150 PRINT#ch%,keyend%,message%,statements%
1160 PRINT "Saving keywords,"
1170 FOR i%=1 TO keyend%
1180 PRINT#ch%,table$(i%)
1190 NEXT
1200 PRINT "Saving error messages,"
1210 FOR i%=1 TO message%
1220 PRINT#ch%,error$(i%)
1230 NEXT
1240 PRINT "Saving compulsory statements,"
1250 FOR i%=1 TO statements%
1260 PRINT#ch%,order%(i%)
1270 NEXT
1280 CLOSE#ch%
1290 ENDPROC
1300:
1310 REM menu data
1320 DATA Compiler,Interpreter,Quit
1330:
1340 REM compiler's lexicon
1350 DATA IDENTIFICATION,ENVIRONMENT,DATA,PROCEDURE,CONFIGURATION,INPUT_OUTPUT,FILE,WORKING_STORAGE,MOVE,ADD,SUBTRACT,MULTIPLY,DIVIDE,DISPLAY,OPEN,CLOSE,INPUT,OUTPUT,READ,WRITE,SELECT
1360 DATA PROGRAM_ID,AUTHOR,DATE_WRITTEN,REMARKS,SOURCE_COMPUTER,OBJECT_COMPUTER,FILE_CONTROL,@,@,RUN,STOP,DIVISION,SECTION,DISK,BBC_MICRO,ASSIGN,TO,BY,FROM,GIVING,PIC,VALUE,AT,END,FD,GO,IS,LABEL,RECORDS,ARE,OMITTED,KEYBOARD
1370 DATA IF,EQUAL,GREATER,SMALLER,THAN
1380 DATA *
1390:
1400 REM compiler error messages
1410 DATA SYNTAX,NO SUCH VARIABLE,TYPES INCOMPATIBLE,LABEL EXISTS,NO SUCH LABEL,VARIABLE ALREADY DEFINED,BAD PICTURE,TOO MANY FILES,UNDEFINED FILE,NO SUCH FILE
1420 DATA NOT IN WORKING STORAGE,LINE TO LONG,NUMBER TOO BIG,UNDECLARED FILE,BAD LEVEL,INVALID DATA,INVALID FILENAME,NO/MISSING QUOTES,MISSING LABEL,TOO MANY FIELDS,TOO MANY LABELS
1430 DATA TOO MANY LITERALS,NO PCODE SPACE LEFT,FULL STOP EXPECTED,WORD TOO LONG,RECORD TOO LONG,LITERAL TOO LONG
1440 DATA *
1450:
1460 REM compulsory statements
1470 DATA 1,22,23,24,25,2,5,26,27,6,28,21,3,7,8,4,31
1480 DATA -1
```

Listing 2

```
10REM Small COBOL Compiler by Jeff Morgan
20REM (c) BAU March 199Ø
30:
40IF PAGE<>&13ØØ THEN PAGE=&13ØØ:CHAIN"COMPILE"
50MODE 7:ON ERROR PROCend
60PROCinit:PROCdtin:PROCconfig:PROCbegin:PROCcompile:PROCdetails:PRINT"Press SPACE for MENU":REPEAT:UNTIL GET=32
70CHAIN"MENU"
80END
90:
100DEFPROCcompile:LOCAL e%,end%:L%=Ø:lev%=Ø:lv%=Ø:fld%=Ø:llv%=Ø:REPEAT:opc%=pc%:alr%=Ø:ad%=Ø:er%=Ø:ok%=TRUE:fatal%=Ø:ad%=FALSE:ok%=TRUE:IF dt% THEN llv%=lv%:L%=L%+1:fld%=fld%+1:IF L%>15 THEN fatal%=1:GOTO22Ø
110e%=FNderr(FNgl):IF e%>Ø GOTO13Ø
120PROCdiv:e%=FNderr(FNchsyn)
130IF e%>Ø THEN alr%=TRUE
140IF en% THEN e%=FNanen
150IF dt% THEN e%=FNandt
160IF proc% THEN e%=FNanproc
170PROCdismiss(FNchorder)
180IF A%>Ø THEN sta%(A%)=TRUE:A%=Ø
190IF NOT alr% THEN e%=FNderr(e%)
200IF show% THEN PROCprintln
210IF ad% AND ok% THEN pc%=FNatp(opc%,pc%)
220IF fatal%>Ø THEN e%=FNderr(fatal%+19):end%=FNfatal(fatal%):IF end% eop%=TRUE:GOTO 24Ø
230PROCnulns:UNTIL eop%
240CLOSE#in%:IF NOT end%:IF mk%>Ø THEN e%=FNderr(FNfm)
250ENDPROC
260:
270DEFFNgl:LOCAL wd$,S%,e%:lex%=Ø:eol%=Ø:cr%=Ø
280REPEAT:wd$=FNgw:IF fatal%<>Ø THEN eol%=TRUE:GOTO 38Ø
290num%=FNlex(wd$):IF num%=-1 THEN num%=FNfndvariable(wd$,Ø)
300IF num%=-1 THEN num%=FNfndvariable(wd$,Ø)
310IF num%=-1 THEN num%=FNfndfile(wd$)
320IF lex%>mll% THEN lex%=Ø:e%=12:GOTO 38Ø
330IF id% OR en% THEN GOTO 36Ø
340IF num%=-1 AND FNchlit(wd$) THEN num%=FNfndlit(wd$)
350IF num%=-1 AND FNchlit(wd$) THEN num%=FNadlit(wd$):S%=TRUE
360lex%=lex%+1:ln%(lex%)=num%
370IF S% THEN ln$(lex%)=FNnq(wd$) ELSE ln$(lex%)=wd$
380UNTIL eol% OR eop% OR cr% OR e%>Ø:IF NOT P% PRINT
390=e%
400:
410DEFPROCnulns:LOCAL i%:FOR i%=1 TO lex%:ln%(i%)=Ø:ln$(i%)="":NEXT:ENDPROC
420:
430DEFPROCprintln:LOCAL i%:IF ad% AND ok% THEN PRINT;"+";
440FOR i%=1 TO lex%:PRINT;ln%(i%);" ";:NEXT:PRINT:ENDPROC
450:
460DEFFNatp(old%,new%):LOCAL i%:FOR i%=1 TO lex%:pc%(i%+old%)=ln%(i%):pc%=pc%+1:NEXT:pc%=pc%+1:IF pc%>168 THEN pc%=Ø:fatal%=4
470IF eol% THEN pc%(pc%)=-1
480IF eop% THEN pc%(pc%)=-2
490=pc%
500:
510DEFFNfatal(f%):IF fatal%>=5 AND fatal%<=8 THEN =FALSE ELSE =TRUE
520:
530DEFPROCinit
540*KEY 1 A|MNNY
550*KEY 2 P.HI.-TOP|M
560*KEY 3 PROCdis(Ø)|M
570DIM tbl$(6Ø),dt$(5),nm$(5,16),ptr%(5,16),tp$(5,16),len%(5,16),pt%(5,16),ln%(16),ln$(16),lbl$(2Ø),lblptr%(2Ø),mpc%(2Ø),lm%(2Ø),sta%(52),order%(2Ø),pc%(17Ø),err$(27),file$(4),fl%(4),fifs%(4),lit$(2Ø),stp%(14),lev%(14):CLOSE#Ø
580VDU23;1Ø;Ø;Ø;Ø;:LOCAL i%:files%=5:mrl%=8Ø:mwl%=15:mll%=15:mql%=82:fn%=-1:A%=Ø
590ptr%=Ø:pc%=Ø:lbl%=Ø:cnt%=Ø:fl%=-1:mk%=Ø:lit%=Ø:eop%=Ø:id%=Ø:en%=Ø:dt%=Ø:proc%=Ø:val%=Ø:done%=Ø:sta%(Ø)=17:tk%=Ø:start%=Ø:fatal%=Ø:quo$=CHR$(34):FOR i%=Ø TO files%:ptr%(i%,1)=-1:NEXT:ENDPROC
600:
610DEFPROCdtin:LOCAL i%,ch%:PRINT"INITIALIZING....";:ch%=OPENUP("CDATA"):INPUT#ch%,keyend%,msg%,sment%
620FOR i%=1 TO keyend%:INPUT#ch%,tbl$(i%):NEXT:FOR i%=1 TO msg%:INPUT#ch%,err$(i%):NEXT:FOR i%=1 TO sment%:INPUT#ch%,order%(i%):NEXT:CLOSE#ch%
630ENDPROC
640:
650DEFFNgw:LOCAL a$,wd$,quo%,Q%,dot%:LIT%=FALSE:REPEAT:a$=CHR$(BGET#in%):PRINT;a$;:UNTIL a$<>" " OR EOF#in%
660REPEAT:quo%=FALSE:REPEAT
670IF a$=quo$ AND quo% THEN quo%=FALSE:Q%=TRUE:LIT%=TRUE ELSE IF a$=quo$ THEN quo%=TRUE
680IF a$="." THEN dot%=TRUE
690wd$=wd$+a$:a$=CHR$(BGET#in%)
700IF quo%=TRUE:IF LEN(wd$)>mql% THEN fatal%=8:a$=" ":quo%=FALSE:GOTO 73Ø
710IF quo%=FALSE AND NOT Q%:IF LEN(wd$)>mwl% THEN fatal%=6:a$=" ":GOTO 73Ø
720PRINT;a$;
730UNTIL NOT quo% OR a$=CHR$(13) OR EOF#in%
740UNTIL a$=" " OR a$=CHR$(13) OR EOF#in%
750IF a$=CHR$(13) THEN cr%=TRUE
760IF cr% AND dot% THEN eol%=TRUE:wd$=LEFT$(wd$,LEN(wd$)-1)
770IF cr% AND NOT dot% THEN fatal%=5
780IF EOF#in% THEN eop%=TRUE
790=wd$
800:
810DEFFNlex(wd$):LOCAL i%,mt%:REPEAT:i%=i%+1:mt%=(wd$=tbl$(i%)):UNTIL mt% OR i%=keyend%:IF mt% THEN =i% ELSE =-1
820:
830DEFFNfndlbl(lbl$):LOCAL i%,mt%:IF lbl%=Ø THEN =-1
840REPEAT:i%=i%+1:mt%=(lbl$=lbl$(i%)):UNTIL mt% OR i%=lbl%:IF mt% THEN =i% ELSE =-1
850:
860DEFFNfndfld(it$,fl%):LOCAL i%:REPEAT:i%=i%+1:mt%=(nm$(fl%,i%)=it$):UNTIL mt% OR ptr%(fl%,i%)=-1:IF mt% THEN =i%
870=-1
880:
890DEFFNfndlit(it$):LOCAL i%,mt%:IF lit%=Ø THEN =-1
900REPEAT:i%=i%+1:mt%=(it$=lit$(i%)):UNTIL mt% OR i%=lit%:IF mt% THEN =i% ELSE =-1
910:
920DEFFNchlit(it$):IF RIGHT$(it$,1)=quo$ AND LEFT$(it$,1)=quo$ THEN =TRUE
930=FALSE
940:
950DEFFNadlit(it$):lit%=lit%+1:IF lit%>20 THEN lit%=Ø:fatal%=3:GOTO 97Ø
960lit$(lit%)=FNnq(it$)
```

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COBOL

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```
970=lit%
980:
990DEFFNnq(a$):a$=LEFT$(a$,LEN(a$)-1):=RIGHT$(a$,LEN(a$)-1)
1000:
1010DEFFNchorder:LOCAL i%,e%,sment%:REPEAT:i%=i%+1:sment%=order%(i%):IF i%<=tk%:IF NOT sta%(sment%) THEN e%=TRUE
1020UNTIL i%=sta%(0) OR e%
1030IF e% THEN A%=sment%
1040IF e% THEN =i% ELSE =0
1050:
1060DEFPROCdismiss(s%):LOCAL a$:IF s%=0 THEN ENDPROC
1070cnt%=cnt%+1:IF s%>0 AND s%<5 THEN a$="DIVISION "
1080IF s%>4 AND s%<9 THEN a$="SECTION "
1090IF s%=49 THEN a$="CLAUSE "
1100PRINT'"<<< ";tbl$(order%(s%));" ";a$;"EXPECTED >>>"':ENDPROC
1110ENDPROC
1120:
1130DEFFNanen:IF ln%(1)=28 THEN sta%(28)=TRUE:tk%=11
1140IF ln%(1)<>21 THEN =0
1150IF fn%<4 THEN PROCadfile(ln$(2)):IF ln%(4)=35 THEN fl%(fn%)=0
1160IF fn%<5:IF ln%(4)=53 THEN fl%(fn%)=2
1170=0
1180:
1190DEFPROCadfile(fnm$):fn%=fn%+1:IF fn%>4 ENDPROC
1200file$(fn%)=fnm$:fifs%(fn%)=0:ENDPROC
1210:
1220DEFFNfndfname(fn$):LOCAL i%,mt%:i%=-1:REPEAT:i%=i%+1:mt%=(fn$=file$(i%)):UNTIL mt% OR i%=files%-1:IF mt% THEN =i% ELSE =-1
1230:
1240DEFFNchfifs:LOCAL e%,i%:REPEAT:i%=i%+1:IF fifs%(i%)=FALSE AND file$(i%)<>"" THEN e%=14
1250UNTIL e%>0 OR i%=4
1260IF i%=4 THEN e%=0
1270=e%
1280:
1290DEFFNandt:LOCAL e%,f%,fndfld%:IF ln%(1)=49 OR ln%(1)=3 L%=0:fld%=0:lev%=0:=0
1300pic%=TRUE:IF ln%(1)<>46 AND ln%(1)<>49 AND ln%(1)<>3 AND ln%(1)<>7 THEN lv%=FNvalidlv(ln$(1))
1310IF (lex%=2 AND ln%(3)<>42) OR ln%(1)=46 OR ln%(1)=49 THEN pic%=FALSE
1320IF ln%(1)=8 THEN PROCorem(L%-1,fl%):fl%=5:L%=0:lev%=0:lv%=0:llv%=0:fld%=0
1330IF ln%(1)=46 PROCorem(L%-1,fl%):fl%=fl%+1:lev%=0
1340IF ln%(1)=49 OR ln%(1)=46 THEN L%=0:lev%=0:lv%=0:llv%=0:fld%=0
1350IF ln%(1)=7 AND ln%(2)=34 THEN L%=0:lev%=0:lv%=0:llv%=0:fld%=0
1360f%=FNfndfname(ln$(2))
1370IF f%>0 THEN fifs%(f%)=TRUE
1380IF lv%>llv% PROCnewlv(llv%,L%,fl%)
1390IF lv%<llv% PROColevel(llv%,L%,fl%)
1400IF lv%<llv% AND NOT pic% PROCnewlv(llv%,L%,fl%)
1410IF NOT pic% THEN =0
1420IF NOT er% THEN e%=FNeval_pic(ln$(4))
1430IF NOT er% THEN PROCres(ln$(2),varlen%,vartp$,fl%)
1440fndfld%=FNfndfld(ln$(2),fl%)
1450IF NOT er% AND pt% THEN pt%(fl%,fld%)=ptpl%
1460IF val% AND N% e%=FNinsnum(ln$(2),ln$(7),fl%,fld%):ok%=TRUE:e%=FNinsnum(ln$(2),ln$(7),fl%,fld%):ok%=TRUE:=e%
1470IF (NOT val%) AND N% e%=FNinsnum(ln$(2),"0",fl%,fld%):ok%=TRUE:=e%
1480IF val% AND N%=FALSE e%=FNidi(ln$(2),ln$(7)):ok%=TRUE
1490IF lv%<llv% PROColevel(llv%,fld%,fl%)
1500=e%
1510:
1520DEFPROCnewlv(llv%,fld%,fl%):IF pic%=FALSE PROCres(ln$(2),0,"|**",fl%)
1530lev%=lev%+1:stp%(lev%)=fld%:lev%(lev%)=lv%
1540ENDPROC
1550:
1560DEF FNencode(st%,end%)
1570="|"+CHR$(st%+64)+CHR$(end%+64)
1580:
1590DEFPROColevel(llv%,fld%,fl%):IF lev%=0 ENDPROC
1600LOCAL i%:REPEAT:i%=i%+1:UNTIL lev%(i%)=llv% OR i%=lev%:IF lev%(i%)=llv% THEN tp$(fl%,stp%(i%)-1)=FNencode(stp%(i%),fld%-1):lev%(i%)=0:stp%(i%)=0
1610ENDPROC
1620:
1630DEFPROCorem(fld%,fl%):LOCAL i%:IF lev%=0 OR fl%<0 ENDPROC
1640REPEAT:i%=i%+1:IF stp%(i%)-1<0 THEN GOTO 1660
1650IF lev%(i%)<>0 AND LEFT$(tp$(fl%,stp%(i%)-1),1)="|" THEN tp$(fl%,stp%(i%)-1)=FNencode(stp%(i%)-1,fld%):lev%(i%)=0:stp%(i%)=0
1660UNTIL i%=lev%:lev%=0:ENDPROC
1670:
1680DEFFNvalidlv(l$):LOCAL v$,v%:IF LEN(l$)<>2 e%=15:GOTO1730
1690v$="0123456789":IF INSTR(v$,LEFT$(l$,1))=0 OR INSTR(v$,RIGHT$(l$,1))=0 THEN e%=15:GOTO1730
1700v%=VAL(l$):IF v%<10 AND LEFT$(l$,1)<>"0" e%=15:GOTO 1730
1710IF v%>49 e%=15
1720IF v%<10 AND LEFT$(l$,1)<>"0" e%=15
1730IF e%>0 =-1 ELSE =v%
1740:
1750DEFFNanproc:LOCAL i%:ad%=TRUE:IF lex%=1 AND ln%(1)=-1 THEN e%=FNinslbl(ln$(1),pc%+1):ok%=FALSE:lex%=0
1760IF lex%=2 AND ln%(1)=4 THEN ok%=FALSE
1770IF ln%(1)=47 THEN lex%=2:ln%(2)=FNgoval(ln$(3),pc%)
1780IF ln%(1)=9 THEN ln%(3)=ln%(4):lex%=3
1790IF ln%(1)=19 OR ln%(1)=20 THEN ln%(2)=FNfndfname(ln$(2)):IF ln%(3)=44 THEN ln%(3)=47:ln%(4)=FNgoval(ln$(7),pc%+2):lex%=4
1800IF ln%(1)=16 THEN FOR i%=2 TO lex%:ln%(i%)=FNfndfname(ln$(i%)):NEXT
1810IF ln%(1)=15 THEN FOR i%=3 TO lex%:ln%(i%)=FNfndfname(ln$(i%)):NEXT
1820IF ln%(1)>=10 AND ln%(1)<=13 THEN ln%(3)=ln%(4):ln%(4)=ln%(6):lex%=4
1830IF ln%(1)=31 AND ln%(2)=32 THEN sta%(31)=TRUE:tk%=17
1840IF ln%(1)=54 THEN lex%=6:ln%(4)=ln%(5):ln%(5)=ln%(6):ln%(6)=FNgoval(ln$(8),pc%+4)
1850=e%
1860:
1870DEFFNadlbl(lbl$,pc%):LOCAL e%:lbl%=lbl%+1:IF lbl%>20 THEN lbl%=0:fatal%=2:GOTO 1890
1880IF e%=0 THEN lbl$(lbl%)=lbl$:lblptr%(lbl%)=pc%
1890=e%
1900:
1910DEFFNchsyn:LOCAL fs%,chlev%:fs%=ln%(1):IF FNvalidlv(ln$(1))<>-1 THEN chlev%=TRUE
1920IF dt%:IF ln%(1)<>46 AND ln%(1)<>49 AND ln%(1)<>3 AND ln%(1)<>7 AND ln%(1)<>8:IF FNvalidlv(ln$(1))=-1 THEN =15
1930IF proc% AND fs%=-1 THEN =FNchlbl
1940IF fs%>=1 AND fs%<=4 THEN =FNchdiv(fs%)
1950IF fs%>=5 AND fs%<=8 THEN =FNchsec(fs%)
1960IF fs%=9 THEN =FNchmove
1970IF fs%>=10 AND fs%<=13 THEN =FNchcomplex(fs%-9)
1980IF fs%=14 THEN =FNchdis
1990IF fs%=15 THEN =FNchop
2000IF fs%=16 THEN =FNchcl
2010IF fs%=19 OR fs%=20 THEN =FNchread_write
2020IF fs%=21 THEN =FNchassgment
2030IF fs%>=22 AND fs%<=25 THEN =FNchinfo(fs%-21)
2040IF fs%>=26 AND fs%<=27 THEN =FNchcomp(fs%)
2050IF fs%=28 THEN =0
2060IF chlev% THEN =FNchdtassg
2070IF fs%=31 THEN =FNchrunstop
2080IF fs%=46 THEN =FNchfd
2090IF fs%=47 THEN =FNchgo
2100IF fs%=49 THEN =FNchclause
2110IF fs%=54 THEN =FNchcondition
2120=1
2130:
2140DEFFNchlbl:LOCAL num%,e%:IF lex%>1 THEN e%=1
2150num%=FNfndlbl(ln$(1)):IF num%<>-1:IF lblptr%(num%)<>-2 THEN e%=4
2160=e%
2170:
2180DEFFNinslbl(lbl$,pc%):LOCAL num%,e%:num%=FNfndlbl(lbl$):IF num%=-1 THEN e%=FNadlbl(lbl$,pc%):=e%
2190IF num%>0 AND lblptr%(num%)=-2 THEN lblptr%(num%)=pc%
2200=e%
2210:
2220DEFFNgoval(lbl$,pc%):LOCAL num%,pl%,e%:num%=FNfndlbl(lbl$):IF num%>0 THEN pl%=lblptr%(num%)
2230IF num%=-1 THEN e%=FNadlbl(lbl$,-2):PROCadwant(pc%+2,lbl%):pl%=0
2240=pl%
2250:
2260DEFPROCadwant(p%,l%):mk%=mk%+1:mpc%(mk%)=p%:lm%(mk%)=l%:ENDPROC
2270:
2280DEFFNfm:LOCAL i%,e%:FOR i%=1 TO mk%:IF lblptr%(lm%(i%))=-2 THEN e%=20
2290pc%(mpc%(i%))=lblptr%(lm%(i%)):NEXT
2300=e%
2310:
2320DEFFNchop:LOCAL i%,e%:IF ln%(2)<>17 AND ln%(2)<>18 THEN e%=1:GOTO 2350
2330i%=2:REPEAT:i%=i%+1:IF FNfndfname(ln$(i%))=-1 THEN e%=10
2340UNTIL i%=lex% OR e%>0
2350=e%
2360:
2370DEFFNchcl:LOCAL i%,e%:i%=1:REPEAT:i%=i%+1:IF FNfndfname(ln$(i%))=-1 THEN e%=10
2380UNTIL i%=lex% OR e%>0
2390=e%
2400:
2410DEFFNchrunstop:LOCAL e%:IF ln%(2)<>32 THEN e%=1
2420=e%
2430:
2440DEFFNchread_write:LOCAL i%,e%:IF lex%>2 AND lex%<>7 THEN e%=1
2450IF FNfndfname(ln$(2))=-1 THEN e%=10
2460IF lex%=2 THEN GOTO 2480
2470IF ln%(3)<>44 OR ln%(4)<>45 OR ln%(5)<>47 OR ln%(6)<>38 THEN e%=1
2480=e%
2490:
2500DEFFNchdis:LOCAL i%,e%:IF lex%=1 THEN e%=0:GOTO 2530
2510i%=1:REPEAT:i%=i%+1:IF ln%(i%)=-1 THEN e%=2
2520UNTIL i%=lex% OR e%<>0
2530=e%
2540:
2550DEFFNchcomplex(fs%):LOCAL i%,e%:IF D%>0 THEN fn%=0:D%=0
2560IF fn%>0 THEN e%=9:D%=10:GOTO 2630
2570IF lex%<>6 OR ln%(5)<>41 THEN e%=1:GOTO 2660
2580ON fs% GOTO 2590,2600,2610,2620
2590e%=FNchadd:GOTO 2630
2600e%=FNchsub:GOTO 2630
2610e%=FNchmult:GOTO 2630
2620e%=FNchdivide
2630IF e%>0 THEN GOTO 2660
2640i%=0
2650REPEAT:i%=i%+2:e%=FNtest_var(i%):UNTIL i%=6 OR e%>0
2660=e%
2670:
2680DEFFNtest_var(i%):LOCAL comp%,fl%,var%,e%:comp%=FNfndvariable(ln$(i%),0):fl%=FNfile(comp%):var%=FNvar(comp%):IF var%=-1 THEN e%=2:GOTO 2710
2690IF fl%<>5 THEN e%=11:GOTO 2710
2700IF tp$(fl%,var%)="X" THEN e%=3
2710=e%
2720:
2730DEFFNchadd:IF ln%(3)<>38 THEN =1 ELSE =0
2740DEFFNchmult:IF ln%(3)<>39 THEN =1 ELSE =0
2750DEFFNchsub:IF ln%(3)<>40 THEN =1 ELSE =0
2760DEFFNchdivide:IF ln%(3)<>39 THEN =1 ELSE =0
2770:
2780DEFFNchcondition:LOCAL e%,cond%,i%:IF lex%<>8 OR ln%(6)<>47 OR ln%(7)<>38 THEN e%=1:GOTO 2840
2790cond%=ln%(3)-54
2800ON cond% GOTO 2810,2820,2830
2810e%=FNchequal:GOTO 2840
2820e%=FNchgreater:GOTO 2840
2830e%=FNchsmaller
2840IF e%>0 THEN GOTO 2860
2850i%=-1:REPEAT:i%=i%+3:e%=FNtest_var(i%):UNTIL i%=5 OR e%>0
2860=e%
2870:
2880DEFFNchequal:IF ln%(3)<>55 OR ln%(4)<>38 THEN=1 ELSE=0
2890DEFFNchgreater:IF ln%(3)<>56 OR ln%(4)<>58 THEN=1 ELSE=0
2900DEF FNchsmaller:IF ln%(3)<>57 OR ln%(4)<>58 THEN=1 ELSE=0
2910:
2920DEF FNfile(comp%):=(comp% DIV100)-1
2930DEFFNvar(comp%):=comp%-(100*(FNfile(comp%)+1))
2940:
2950DEFFNchdiv(fs%):sta%(fs%)=TRUE:IF fs%=1 tk%=1
2960IF fs%=2 tk%=6
2970IF fs%=3 tk%=13
2980IF fs%=4 tk%=16
2990IF lex%>2 OR ln%(2)<>33 THEN =1 ELSE =0
3000:
3010DEFFNchdtassg:IF lex%<>2 AND lex%<>4 AND lex%<>7 =1
3020IF lex%=2 =0
3030IF lex%=4 OR lex%=7 THEN =FNchass
3040=1
3050DEFFNchfd:sta%(46)=TRUE:fn%=fn%-1:IF lex%<>2 =1
3060IF FNfndfname(ln$(2))=-1 AND fl%<>4 THEN =14
3070IF LEN(ln$(2))<1 OR LEN(ln$(2))>7 THEN =17
3080=0
3090DEFFNchclause:sta%(49)=TRUE:IF ln%(2)<>50 OR ln%(3)<>51 OR ln%(4)<>52 THEN =1
3100=0
3110DEFFNchass:LOCAL e%:val%=FALSE:IF lex%>4 AND lex%<>7 THEN e%=1:GOTO 3150
3120IF ln%(2)<>-1 THEN e%=6:GOTO 3150
3130IF ln%(3)<>42 THEN e%=1:GOTO 3150
3140IF FNeval_pic(ln$(4))=TRUE THEN e%=7
3150IF lex%<>7 THEN =e%
3160val%=TRUE
3170IF ln%(5)<>43 OR ln%(6)<>48 THEN e%=1
3180=e%
3190DEFFNchassgment:sta%(21)=TRUE:tk%=12:IF fn%=4 THEN =8
3200IF lex%<>4 THEN =1
3210IF ln%(3)<>37 THEN =1
3220IF LEN(ln$(2))<1 OR LEN(ln$(2))>7 THEN =17
3230=0
3240DEFFNchinfo(fs%):ON fs% GOTO 3250,3260,3270,3280
3250=FNchprogid
3260=FNchauthor
3270=FNchdate
3280=FNchrems
3290DEFFNchprogid:sta%(22)=TRUE:tk%=2:IF lex%<>2 THEN =1
3300IF ln%(2)<>-1 THEN =1 ELSE =0
3310DEFFNchauthor:sta%(23)=TRUE:tk%=3:IF lex%>3 THEN =1
3320IF ln%(2)<>-1 OR ln%(3)<>-1 THEN =1 ELSE =0
3330DEFFNchdate:sta%(24)=TRUE:tk%=4:IF lex%>2 THEN =1
3340IF ln%(2)<>-1 THEN =1 ELSE =0
3350DEF FNchrems
3360sta%(25)=TRUE:tk%=5
3370=0
3380DEF FNchsec(fs%)
3390sta%(fs%)=TRUE:fs%=fs%-4
3400IF fs%=1 tk%=7
3410IF fs%=2 tk%=10
3420IF fs%=3 tk%=14
3430IF fs%=4 tk%=15
3440IF ln%(1)=8 THEN =FNchfifs
3450IF lex%<>2 OR ln%(2)<>34 THEN =1 ELSE =0
3460DEFFNchcomp(fs%):sta%(fs%)=TRUE:fs%=fs%-25:IF fs%=1 THEN tk%=8
3470IF fs%=2 THEN tk%=9
3480IF lex%<>2 OR ln%(2)<>36 THEN =1 ELSE =0
3490:
3500DEFFNchassgment:IF lex%<>4 THEN =1
3510IF fl%=4 THEN =8
3520IF ln%(2)<>-1 OR ln%(3)<>37 OR ln%(4)<>35 OR ln%(4)<>53 THEN =1 ELSE =0
3530:
3540DEFFNchgo:LOCAL e%,num%:IF lex%<>3 THEN =1
3550IF ln%(2)<>38 OR ln%(3)<>-1 THEN e%=1
3560=e%
3570:
3580DEFFNchmove:LOCAL e%:IF lex%<>4 OR ln%(3)<>38 THEN e%=1
3590IF ln%(2)=-1 OR ln%(4)=-1 THEN e%=2
3600=e%
3610:
3620DEFFNeval_pic(pic$):LOCAL e%,op%,cl%,oppl%,clpl%,tp$,len%:N%=FALSE:SG%=FALSE:oppl%=INSTR(pic$,"("):clpl%=INSTR(pic$,")"):ptpl%=INSTR(pic$,"V")
3630IF oppl%>0 THEN op%=TRUE
3640IF clpl%>0 THEN cl%=TRUE
3650pt%=(ptpl%>0)
3660IF op% AND cl% AND (oppl%<>2 OR clpl%<>LEN(pic$)) THEN e%=TRUE
3670IF op% AND NOT cl% THEN e%=TRUE
3680IF cl% AND NOT op% THEN e%=TRUE
3690IF e% GOTO 3800
3700tp$=LEFT$(pic$,1)
3710sg%=(tp$="S"):SG%=sg%
3720IF sg% THEN s$=tp$:tp$=MID$(pic$,2,1)
3730IF INSTR("9XA",tp$)=0 THEN e%=TRUE
3740IF e% GOTO 3800
3750IF op% AND cl% THEN len%=VAL(MID$(pic$,3,LEN(pic$)-1)):IF len%<1 THEN e%=TRUE
3760IF e% GOTO 3800
3770IF NOT op% AND NOT cl% THEN len%=FNeval_list(pic$,tp$):IF len%=-1 THEN e%=TRUE
3780vartp$=tp$:varlen%=len%
3790IF tp$="9" N%=TRUE
3800=e%
3810:
```

Continued ▶

COBOL

◀ **Continued**

```
 382ØDEFFNeval_list(pic$,tp$):LOCAL i%,b
it$,cnt%,mt%:cnt%=Ø:REPEAT:i%=i%+1:mt%=Ø
:bit$=MID$(pic$,i%,1):IF bit$=tp$ THEN c
nt%=cnt%+1:mt%=TRUE
 383ØIF bit$="V" THEN cnt%=cnt%+1:mt%=TR
UE
 384ØIF bit$="S" THEN cnt%=cnt%+1:mt%=TR
UE
 385ØUNTIL NOT mt% OR i%=LEN(pic$)
 386ØIF NOT mt% THEN cnt%=-1
 387Ø=cnt%
 388Ø:
 389ØDEFFNinsnum(f$,num$,fl%,fld%):LOCAL
 pt%,int$,dec$,sp%,is%,ds%,e%,int%,dec%,
area$,sg$,sg%:area$=FNloc(fl%,fld%):sg$=
LEFT$(num$,1):IF sg$="-" OR sg$="+" THEN
 num$=RIGHT$(num$,LEN(num$)-1)
 39ØØIF INSTR("+-",sg$)=Ø THEN sg$="+"
 391Øsp%=len%(fl%,fld%):IF sp%=ØTHEN sp%
=LEN(dt$(fl%))
 392Øpt%=INSTR(num$,".")
 393ØIF pt%(fl%,fld%)<>Ø is%=pt%(fl%,fld
%)-1 ELSE is%=sp%
 394ØIF INSTR("S+-",LEFT$(area$,1))>Ø OR
 SG% THEN is%=is%-1:sg%=TRUE
 395Øint$=LEFT$(num$,pt%-1):IF VAL(int$)
=Ø THEN int$="Ø"
 396ØIF LEN(int$)>is% THEN =13
 397ØIF pt%(fl%,fld%)=Ø ds%=sp%:GOTO4ØØØ
 398Øds%=sp%-pt%(fl%,fld%):dec$=MID$(num
$,pt%+1,ds%):IF pt%=Ø THEN dec$="Ø"
 399Ødec$=FNpad(dec$,ds%)
 4ØØØint$=FNppad(int$,is%):IF sg% THEN i
nt$=sg$+int$
 4Ø1Ønum$=int$+"."+dec$:e%=FNidi(f$,num$
)
 4Ø2Ø=Ø
 4Ø3ØDEFFNfndvariable(it$,opt%):LOCAL i%
,mt%:inf%=-1:REPEAT:i%=Ø:inf%=inf%+1:REP
EAT:i%=i%+1:IF it$=nm$(inf%,i%) THEN mt%
=TRUE
 4Ø4ØUNTIL ptr%(inf%,i%)=-1 OR mt%:UNTIL
 inf%=5 OR mt%
 4Ø5ØIF opt%=Ø AND mt% THEN i%=FNvariabl
e(i%,inf%)
 4Ø6ØIF NOT mt% THEN =-1 ELSE =i%
 4Ø7ØDEFFNfndfile(f$):LOCAL i%,mt%:i%=-1
:REPEAT:i%=i%+1:mt%=(file$(i%)=f$):UNTIL
 mt% OR i%=4:IF mt% THEN =i% ELSE =-1
 4Ø8ØDEFPROCdiv:IF ln%(1)=1 AND ln%(2)=3
3 THEN id%=TRUE
 4Ø9ØIF ln%(1)=2 AND ln%(2)=33 THEN en%=
TRUE:id%=FALSE
 41ØØIF ln%(1)=3 AND ln%(2)=33 THEN dt%=
TRUE:en%=FALSE
 411ØIF ln%(1)=4 AND ln%(2)=33 THEN proc
%=TRUE:dt%=FALSE:PROCorem(L%,fl%)
 412ØENDPROC
 413ØDEFPROCspc(pc%):LOCAL i%,fl%:PRINT'
"Saving pcode in <";out$;">":out%=OPENOU
T(out$):PRINT#out%,pc%:FOR i%=1 TO pc%:P
RINT#out%,pc%(i%):NEXT
 414ØFOR fl%=Ø TO 5:PRINT#out%,dt$(fl%):
i%=Ø:REPEAT:i%=i%+1:PRINT#out%,ptr%(fl%,
i%),tp$(fl%,i%),len%(fl%,i%),pt%(fl%,i%)
:UNTIL ptr%(fl%,i%)=-1:NEXT
 415ØFOR i%=Ø TO 4:PRINT#out%,file$(i%),
fl%(i%):NEXT:PRINT#out%,lit%:FOR i%=1 TO
 lit%:PRINT#out%,lit$(i%):NEXT:CLOSE#out
%
 416ØENDPROC
 417ØDEFPROCbegin:CLS:IF P% THEN PROCph(
in$,R$)
 418ØPRINT'"compiling..."':in%=OPENUP(in
$):ENDPROC
 419ØDEFPROCdetails:PRINT'STRING$(39,"_"
):IF P% PRINT
 42ØØPRINT"Compilation of <";in$;"> comp
lete."';cnt%;" compilation error(s)."'"P
code is ";pc%;"(+) bytes long.":IF save%
 AND cnt%=Ø THEN PROCspc(pc%)
 421ØPRINT'STRING$(39,"_")
 422ØVDU3
 423ØENDPROC
 424ØDEFPROCend:*FX12,4
 425ØIF ERR=17 THEN CHAIN"MENU"
 426ØCLOSE#Ø:VDU3:PRINT''"Sorry, can't c
ontinue. An error has"'"occured in the C
ompiler itself.":REPORT:PRINT " at line
";ERL:END
 427ØDEFPROCconfig:LOCAL a$,ch%:PROChead
("Small COBOL Compiler"):VDU 28,1,23,39,
2:REPEAT:CLS:in$=FNgfn(1,7):ch%=OPENUP(i
n$):CLOSE#ch%:IF ch%=Ø THEN PRINT'"NO SU
CH FILE!":PROCspace:UNTIL ch%=17
 428Øsave%=FNans("Save pcode"):IF save%
THEN out$=FNgfn(2,7)
 429ØW%=FNans("Wait on error"):show%=FNa
ns("Show pcode"):P%=FNans("Print compila
tion"):IF P%:IF FNans("Remarks") R$=FNgf
n(3,7Ø) ELSE R$=""
 43ØØPROCspace:CLS
 431ØENDPROC
 432ØDEFFNgfn(q%,max%):LOCAL x%,y%,f$,fi
le$,d$,ok%:IFq%=3THENq$="Remarks ? ":GOT
O435Ø
 433ØIF q%=1 THEN f$="Source code":d$="C
" ELSE f$="Pcode":d$="P"
 434Øq$=f$+" filename ? "+d$+"."
 435ØPRINT'q$;:x%=POS:y%=VPOS:REPEAT:INP
UT TAB(x%,y%)file$:len%=LEN(file$):IF le
n%=Ø AND q%=2 THEN len%=LEN(in$)-2:file$
=RIGHT$(in$,len%):PRINT TAB(x%,y%)file$
 436Øok%=(len%>Ø AND len%<max%+1):IF NOT
 ok% THEN PRINT TAB(x%,y%);STRING$(len%,
" "):VDU 7
 437ØUNTIL ok%
 438Ø=d$+"."+file$
 439Ø:
 44ØØDEFFNderr(e%):LOCAL key%:IF e%=Ø TH
EN GOTO 442Ø
 441Øcnt%=cnt%+1:er%=TRUE:PRINT'">>> ";e
rr$(e%);" ERROR <<<"':IF W% THEN key%=GE
T
 442Ø=e%
 443Ø:
 444ØDEFFNvariable(var%,fl%):=((fl%+1)*1
ØØ)+var%
 445Ø:
 446ØDEFFNans(q$):LOCAL a$:PRINT'q$;" (Y
/N) ? ";:REPEAT:a$=GET$:UNTIL a$="Y" OR
a$="N":PRINT;a$:=(a$="Y")
 447Ø:
 448ØDEFPROCspace:PRINT TAB(4,2Ø);"Press
 SPACE BAR to continue";:REPEAT UNTIL GE
T=32:ENDPROC
 449Ø:
 45ØØDEFPROChead(a$):CLS:PRINTTAB(Ø,Ø);C
HR$(132);CHR$(157);CHR$(131);CHR$(141);T
AB((39-LEN(a$)) DIV 2,Ø);a$;TAB(Ø,1);CHR
$(132);CHR$(157);CHR$(131);CHR$(141);TAB
((39-LEN(a$)) DIV 2,1);a$:ENDPROC
 451Ø:
 452ØDEFPROCph(in$,r$):VDU2
 453ØLOCALch$,a$:ch$="=":r$=LEFT$(r$,75)
:PRINTSTRING$(79,ch$):a$="Small COBOL Co
mpiler":PRINTch$TAB((79-LENa$)DIV2)a$TAB
(78)ch$'ch$TAB(78)ch$:a$=" Compilation o
f file <"+in$+">":PRINTch$TAB((79-LENa$)
DIV2)a$TAB(78)ch$'ch$TAB(78)ch$
 454ØPRINTch$TAB((79-LENr$)DIV2)r$TAB(78
)ch$'STRING$(79,ch$):ENDPROC
 455Ø:
 456ØDEFPROCres(nm$,len%,tp$,fl%)
 457ØLOCAL i%,sum%:REPEAT:i%=i%+1:sum%=s
um%+len%(fl%,i%):UNTIL ptr%(fl%,i%)=-1:I
F sum%+len%>mrl% THEN fatal%=7:ENDPROC
 458Ønm$(fl%,i%)=nm$:ptr%(fl%,i%)=sum%+1
:ptr%(fl%,i%+1)=-1:len%(fl%,i%)=len%:tp$
(fl%,i%)=tp$:dt$(fl%)=dt$(fl%)+STRING$(l
en%,","):ENDPROC
 459Ø:
 46ØØDEF FNidi(nm$,it$)
 461ØLOCAL i%,inf%,e%:inf%=-1:REPEAT:inf
%=inf%+1:i%=Ø:REPEAT:i%=i%+1:UNTIL nm$=n
m$(inf%,i%) OR ptr%(inf%,i%)=-1:UNTIL in
f%=5 OR nm$=nm$(inf%,i%):e%=FNvalidate(i
nf%,i%,it$)
 462Øit$=FNpad(it$,len%(inf%,i%)):dt$(in
f%)=FNcutup(dt$(inf%),it$,i%,inf%):=e%
 463Ø:
 464ØDEF FNvalidate(fl%,it%,it$)
 465ØLOCAL tp$,i%,e%,len%,ok%
 466Øtp$=tp$(fl%,it%)
 467ØIF LEN(it$)>len%(fl%,it%) THEN e%=1
7
 468ØIF tp$<>"9":IF NOT LIT% THEN e%=18
 469ØIF tp$="X" THEN =e%
 47ØØlen%=LEN(it$):i%=Ø
 471ØREPEAT
 472Øi%=i%+1:ch%=ASC(MID$(it$,i%,1))
 473Øok%=FNvd(tp$,ch%,i%)
 474ØUNTIL NOT ok% OR i%=len%
 475ØIF NOT ok% THEN e%=16
 476Ø=e%
 477Ø:
 478ØDEF FNvd(tp$,ch%,i%)
 479ØLOCAL ok%:ok%=FALSE
 48ØØIF tp$="9":IF (ch%>47 AND ch%<58) O
R ch%=46 THEN ok%=TRUE
 481ØIF tp$="9":IF (ch%=83 OR ch%=43 OR
ch%=45) AND i%=1 THEN ok%=TRUE
 482ØIF tp$="A":IF (ch%>64 AND ch%<91) T
HEN ok%=TRUE
 483Ø=ok%
 484ØDEFFNcutup(a$,it$,i%,fl%):LOCAL l$,
r$:l$=LEFT$(a$,ptr%(fl%,i%)-1):IF ptr%(f
l%,i%+1)=-1 THEN r$="" ELSE r$=RIGHT$(a$
,LEN(a$)-ptr%(fl%,i%+1)+1)
 485Ø=l$+it$+r$
 486ØDEFFNloc(fl%,it%):IF ptr%(fl%,it%)<
>-1 THEN =MID$(dt$(fl%),ptr%(fl%,it%),le
n%(fl%,it%)) ELSE ="|"
 487ØDEFFNpad(a$,l%):=LEFT$(a$+STRING$(l
%,","),l%)
 488ØDEFFNppad(a$,l%):=RIGHT$(STRING$(l%
,",")+a$,l%)
```

BLUNDERBOX

Several programs in BAU have caused problems over the last few months. Many people had difficulty with the View printer driver program from the November 1989 issue. Help is now at hand by sending a blank disc (plus return postage) to the usual BAU address. A full working copy of the program is included plus the demonstration files that were absent from the monthly disc.

The Fax Form program from July 1989 proved another stumper with its printout routine. The program was written to work with a 9-Pin Canon 1080 printer but fails with Epson compatibles which don't support the 16-dot graphic image mode. The solution is to change line 3980 from

```
3980 IF horiz% THEN gron$=CHR$27+"^"+CHR$17+CHR$208+CHR$2 ELSE gron$=CHR$27+"^"+CHR$17+CHR$104+CHR$1
```

to

```
3980 IF horiz% THEN gron$=CHR$27+"^"+CHR$1+CHR$208+CHR$2 ELSE gron$=CHR$27+"^"+CHR$1+CHR$104+CHR$1
```

People who are experiencing difficulties with line-feeds (or lack of them) can change lines 4200 and 4290 from

```
VDU 1,13
```

to

```
VDU 1,13,1,10
```

Listing 1

```
10 REM >Turnip2/1
20 REM By Walter Trypsin
30 REM For Archimedes only
40 REM (c) BAU March 1989
50 :
60 ON ERROR GOTO 130
70 MODE 13:OFF
80 PROCinit
90 PROCcode(128,both)
100 PROCsetspec
110 PROCdraw(rays,spectrum,2)
120 PROCrun
130 MODE 0
140 IF ERR <> 17 PRINT REPORT$;" at line ";ERL
150 END
160 :
170 DEF PROCcode(size,flag)
180 DIM code 4000
190 rad  = 3
200 peek = 4
210 poke = 5
220 dirp = 6
230 dir  = 7
240 loop = 8
250 side = 9
260 sp   = 13
270 link = 14
280 pc   = 15
290 FOR pass = 0 TO 2 STEP 2
300 P% = code
310 [OPT pass
320 .dirtab
330 EQUD 1
340 EQUD 320
350 EQUD -1
360 EQUD -320
370 :
380 .dirtab2
390 EQUD 320
400 EQUD 1
410 EQUD -320
420 EQUD -1
430 :
440 .screen
450 EQUD 148
460 EQUD -1
470 :
480 .move
490 MOV rad,#0
500 LDR peek,screen
510 LDR poke,screen+4
520 .mainloop
530 TST rad,#1
540 ]
550 CASE flag OF
560   WHEN -1 :
570     [OPT pass:ADR dirp,dirtab:]
580   WHEN 0 :
590     [OPT pass:ADREQ dirp,dirtab:]
600   WHEN 1
610     [OPT pass:ADR dirp,dirtab2:]
620 ENDCASE
630 [OPT pass
640 MOV side,#4
650 .sideloop
660 LDR dir,[dirp],#4
670 ADD pc,pc,rad,ASL #4
680 MOVNV R0,R0
690 ]
700 FOR i% = 1 TO size * 2 - 1
710 [OPT pass
720 LDRB R0,[peek,dir]!
730 STRB R0,[poke],dir
740 ]
750 NEXT
760 [OPT pass
770 SUBS side,side,#1
780 BNE sideloop
790 ADD peek,peek,#320
800 ADD poke,poke,#320
810 ADD peek,peek,#1
820 ADD poke,poke,#1
830 ADD rad,rad,#1
840 CMP rad,#size
850 BNE mainloop
860 MOV pc,link
870 :
880 ]NEXT
890 SYS "OS_ReadVduVariables",screen,screen
900 !screen = !screen + 32 + (128 - size) * 321
910 screen!4 = !screen + &14000
920 ENDPROC
930 :
940 DEF PROCrun
950 bank = 2
960 space = FALSE
970 REPEAT
980 CALL move
990 WAIT
1000 SYS 6,113,bank
1010 SYS 6,112,3 - bank
1020 CLS
1030 bank = 3 - bank
1040 SWAP !screen,screen!4
1050 IF INKEY-74 THEN
1060   REPEAT UNTIL NOT INKEY-74
1070 ENDIF
1080 IF INKEY-99 THEN
1090   IF NOT space THEN
1100     FOR n% = 0 TO 12 STEP 4
1110       SWAP dirtab!n%,dirtab2!n%
1120     NEXT
1130     space = TRUE
1140   ENDIF
1150 ELSE
1160   space = FALSE
1170 ENDIF
1180 UNTIL 0
1190 ENDPROC
1200 :
1210 DEF PROCinit
1220 ORIGIN 640,512
1230 VDU 24,-511;-511;511;511;
1240 FOR bank = 1 TO 2
1250 SYS 6,112,3 - bank
1260 CLS
1270 NEXT
1280 Edge = 127 * 4
1300 spectrum = 0
1310 bands = 1
1330 rays = 0
1340 squares = 1
1350 rings = 2
1360 string = 3
1380 left = -1
1390 both = 0
1400 right = 1
1410 ENDPROC
1420 :
1430 DEF PROCsetspec
1440 DIM r%(18),g%(18),b%(18)
1450 FOR col% = 0 TO 17
1460 READ r%(col%),g%(col%),b%(col%)
1470 NEXT
1480 numspec = 18 * 4
1490 ENDPROC
1500 :
1510 DATA 0,0,3
1520 DATA 0,1,3 , 0,2,3 , 0,3,3
1530 DATA 0,3,2 , 0,3,1 , 0,3,0
1540 DATA 1,3,0 , 2,3,0 , 3,3,0
1550 DATA 3,2,0 , 3,1,0 , 3,0,0
1560 DATA 3,0,1 , 3,0,2 , 3,0,3
1570 DATA 2,0,3 , 1,0,3
1580 :
1590 DEF PROCspectrum(a%)
1600 t% = (a% MOD 4)<<6
1610 a% =  a% DIV 4
1620 c% = (b%(a%)<<4) + (g%(a%)<<2) + r%(a%)
1630 GCOL c% TINT t%
1640 ENDPROC
1650 :
1660 DEF PROCgcol(col%,int%)
1670 tint = int% MOD 4
1680 bits = (int% DIV 4) + 1
1690 r% = SGN(col% AND 1) * bits
1700 g% = SGN(col% AND 2) * bits
1710 b% = SGN(col% AND 4) * bits
1720 GCOL (b%<<4) + (g%<<2) + r% TINT (tint<<6)
1730 ENDPROC
1740 :
1750 DEF PROCdraw(pattern,colours,step)
1760 CASE colours OF
1770   WHEN spectrum :
1780     colour = 0
1790   WHEN bands :
1800     colour = 1
1810     coladd = 1
1820     colmin = 1
1830     colmax = 7
1840     :
1850     intens = 0
1860     intadd = 1
1870     intmin = 0
1880     intmax = 11
1890 ENDCASE
1900 val = 0
1910 REPEAT
1920 CASE colours OF
1930   WHEN spectrum :
1940     PROCspectrum(colour)
1950     colour = (colour + 1) MOD numspec
1960   WHEN bands :
1970     PROCgcol(colour,intens)
1980     intens += intadd
1990     IF intens = intmin OR intens = intmax intadd = -intadd
2000     IF intens = intmin THEN
2010       colour += coladd
2020       IF colour > colmax colour = colmin
2030     ENDIF
2040 ENDCASE
2050 CASE pattern OF
2060   WHEN rays :
2070     PROCrays(val-128,step)
2080   WHEN squares :
2090     PROCsquare(val)
2100   WHEN rings :
2110     PROCring(val)
2120   WHEN string :
2130     PROCstring(val-128)
2140 ENDCASE
2150 val += step
2160 UNTIL val = 256
2170 ENDPROC
2180 :
2190 DEF PROCrays(x%,s%)
2200 MOVE 0,0:MOVE x% * 4,-Edge:PLOT 85,(x% + s%) * 4,-Edge
2210 MOVE 0,0:MOVE -Edge,x% * 4:PLOT 85,-Edge,(x% + s%) * 4
2220 MOVE 0,0:MOVE -x% * 4,Edge:PLOT 85,-(x% + s%) * 4,Edge
2230 MOVE 0,0:MOVE Edge,-x% * 4:PLOT 85,Edge,-(x% + s%) * 4
2240 ENDPROC
2250 :
2260 DEF PROCsquare(x%)
2270 ang = x% * 2 * PI / 256
2280 size = (256 - x%) * 4
2290 MOVE size * COSang,size * SINang
2300 MOVE -size * SINang,size * COSang
2310 PLOT 85, size * SINang,-size * COSang
2320 PLOT 85,-size * COSang,-size * SINang
2330 ENDPROC
2340 :
2350 DEF PROCring(x%)
2360 CIRCLE FILL 0,0,(256 - x%) * 4
2370 ENDPROC
2380 :
2390 DEF PROCstring(x%)
2400 MOVE x% * 4,-Edge
2410 DRAW Edge,x% * 4
2420 DRAW -x% * 4,Edge
2430 DRAW -Edge,-x% * 4
2440 DRAW x% * 4,-Edge
2450 ENDPROC
```

Mon	MUSIC	-	MATHS	ENGLISH	FRENCH	GERMAN	PHYSICS	-
Tue	FRENCH	ENGLISH	PHYSICS	BIOLOGY	-	G A	M	E S
Wed	MUSIC	MATHS	-	ENGLISH	-	CHEM'RY	-	GERMAN
Thu	GERMAN	-	CHEM'RY	FRENCH	-	G A	M	E S
Fri	PHYSICS	MATHS	ENGLISH	BIOLOGY	-	MUSIC	GYM	CHEM'RY

An example Fax Form page printed on a Citizen 180E



The Beebs of *BAU* are pining and the Arcs aching for your programs. If you have written an application in BBC Basic or assembler suitable for publication in *BBC Acorn User*, we want to know about it.

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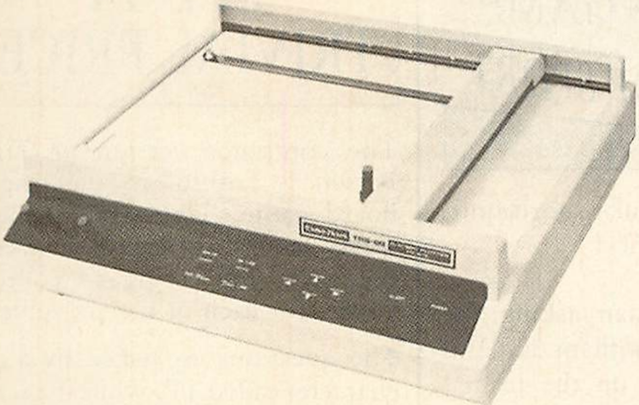
All programs used are paid for and you get your name in lights (or in print, at least) next to your masterpiece in the auspicious pages of this much sought after magazine.

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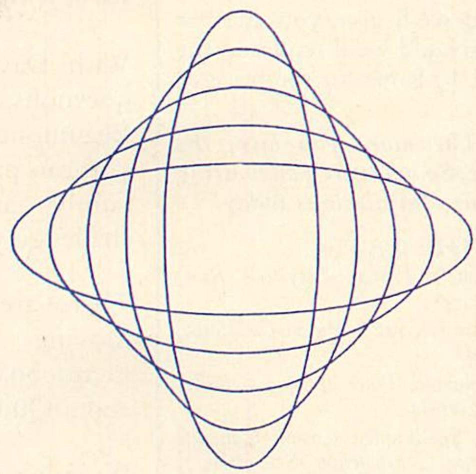
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BBC ACORN USER

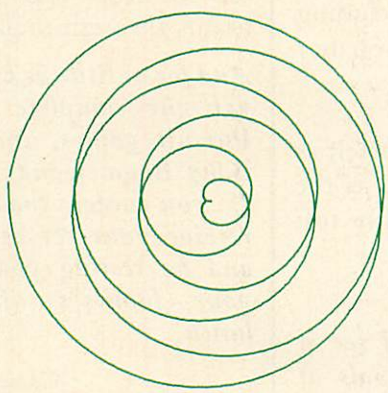
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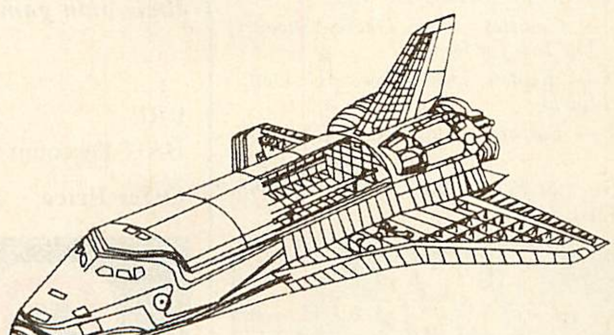


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Sam6 — *Galaforce 2, Hunchback, Hopper, The Sentinel (BBC), Video's Revenge (Electron)*

Sam7 — *Firetrack, Bonecruncher, Snapper, Ghouls*

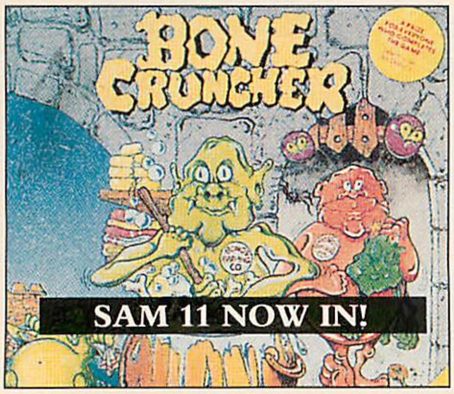
Sam8 — *Winter Olympiad 88, Quest, Around The World In 40 Screens, Mr. Wiz*

Sam9 — *Camelot, Steve Davies Snooker, Spycat, The Life Of Repton*

Sam10 — *Repton Thru Time, 3D Dotty, Zalaga, Qwak*

Sam11 — *Barbarian, Pipeline, Baron, Monsters*

Cassette £9.95, 5.25in Disc £11.95, 3.5in Disc £14.95



CAN YOU BEAT THE SPORTS PROFESSIONALS AT THEIR OWN GAME?
QUESTION OF SPORT

Play TV's most popular sports quiz, for less than half price!

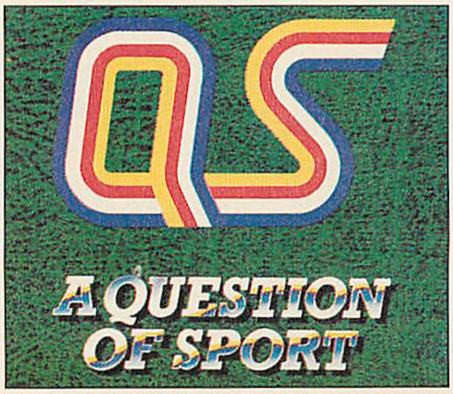
With David Coleman asking the questions and Ian Botham and Bill Beaumont heading up the teams, you can pit your wits against your family and friends, or even challenge your BBC micro.

There are six exciting and fast-moving rounds, including Pictureboard, Mystery Personality and a Quickfire round.

If you've always fancied yourself as a bit of a sports fanatic, this is the program that will thoroughly test your knowledge.

Order your copy today and see if you can beat the professionals at their own game

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The questions are asked by a cute character called TP, while the screen layout shows the board along with the progress of each player.

Don't worry about running out of questions. There are enough in this set to keep you wracking your brains through many sessions.

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CRANKY

An entertaining game where children mend a faulty calculator by creating addition and subtraction sums. The reward is a working calculator to use in their own work. Faults appear in a 0-100 number square and are mended by building sums using two given numbers. For example using numbers 3 and 5, fault 18 is mended. by 3+3+3+3+3+3 or 5+5+5+3. Fun for all developing strategy and computation skills.

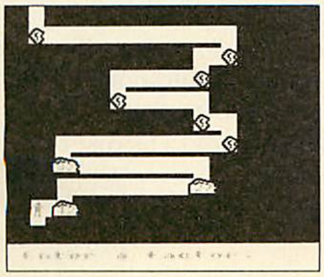


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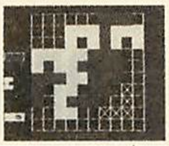
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Help children grasp basic geometric concepts. Working together they visualise and discuss how shapes relate to each other and rotate, reflect and slide shapes in a given space to complete puzzles.

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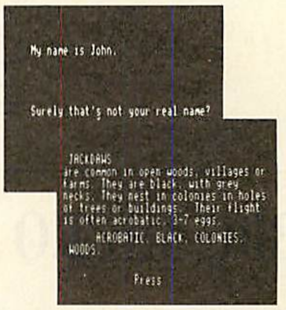
CRACK-IT

Children truly enjoy the challenge of reading coded messages. many will simply guess at letters whereas the successful code reader will use knowledge of high frequency letters, be aware of letter patterns in words and predict words form the positioning of letters in a word. Two secret messages are included to challenge you at first, then write and save your own. Your children will have fun writing coded messages for each other.

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NOTICEBOARD AND CHATTERBOX

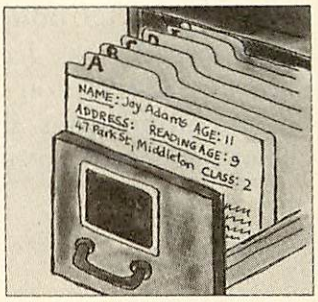


NOTICEBOARD. Create, store retrieve and display short pieces of writing. Similar to a word-processor and database. It's simplicity makes it quite unique. A database of British birds is included so investigations like 'What are scavengers?' or 'What birds are speckled?' can be made for reference in classroom work. New databases are easy to make for book reviews, local information or other topic work.

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SUPASTORE PLUS



SUPASTORE PLUS

SupaStore provides all you need for creating, storing and sorting information. The BBC version includes 16K rom, 2 floppy discs (sample database, utility disc), user guide, keycard. The Compact and Archimedes version includes utilities and sample databases on one 3½in disc, user guide and keycard.

SupaStore Plus gives you all the features of *SupaStore* and more. It contains *SupaStore* and an extra disc. You can modernise your old database system by using files from *Quest, Grass* or *Viewstore* and edit, or add to these files. It includes efficient editing facilities — when you delete records the library is compacted and records are renumbered, so blank records do not appear. It's ideal for personalised letters and detailed reports. You create your own layout for reports, so they appear printed in the format appropriate for your needs. Simply merge *SupaStore* files with any main wordprocessors eg, *Wordwise, View, Edword.* You can also include numerical fields and make simple calculations. It speeds up editing. You can delete, change or append information automatically on a collection of records; delete a group of records and compact the remaining ones; combine two separate databases. You can upgrade your databases from DFS to ADFS if you upgrade your hardware.

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Brian Clough's Football Fortunes

Brian Clough's Football Fortunes is a football management game with a big difference. In an exciting departure from earlier simulation games it combines an excellent range of computer based features with a fascinating board game.
Can you compete with human and computer managers to successfully steer your team through the season, using your skill to make it stronger as you proceed?
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Colossus 4 Bridge

Colossus Bridge allows one player to play a complete game of bridge with the computer controlling the other three hands. Each hand is bid according to the Acol system, while other standard conventions are also available.
If you're a beginner at bridge you can make use of the in-built tutor which has 10 specially chosen hands to illustrate the principles of the game.
In fact, for just £10.99, whether you're a beginner or a more advanced player, you'll find Colossus Bridge is the ideal partner, either for practice or when you can't get another three people together for a game.

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Tank Attack

Tank Attack is a computerised board game for two, three or four players, where each player takes the role of a General commanding a country's Tank Corps of one or more armoured divisions.
Your objective is to capture the enemy headquarters, which will require the planned strategic deployment of your forces and regular fire duels between your own and enemy units. Weather, morale, skill, judgement, planning, foresight, careful management of rebuild and repair facilities and luck all play a part in deciding the result of each game.



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Birdie Barrage Golf

An excellent golf simulation offering you the chance to play at the famous Turnberry Ailsa, Belfry Brabazon, Carnoustie Championship and Acorn Park golf courses.
All the features you'd expect form a good golf game are here, including woods, water and bunkers.
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Colossus 4 Chess

Probably the most complete chess program available for any home computer and written using the very latest techniques, by a computer chess programmer with over eight years experience.
Colossus perfectly understands the rules of chess and can handle all standard mates, while offering you the choice between a two- dimensional flat board or a stunning 3D display.
It comes with a comprehensive instruction manual and must be the best chess program for casual and serious players alike.

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Steve Davis Snooker

This has to be the best snooker simulation you can buy, which is surely proven by the fact that Steve Davis has endorsed it!
It includes a computer play option, infinitely variable speed, spin, friction factor, break score and a foul shot facility, as well as superb graphics.
If you fancy yourself as a good snooker player, for only £9.99 why not see just how good you are at the computer version.

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Sporting Triangles

No matter what your sporting preferences may be, Sporting Triangles is bound to intrigue, puzzle and frustrate you.
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All the features of the top rating TV quiz show are combined in this superbly presented and equally compelling game.

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Football Director

Billed as the ultimate football challenge, Football Director features four leagues with 20 teams each, a 38 game season, home and away matches, FA and League Cups, replays and much, much more.
In fact it's so packed with features it really is almost like the real thing, including player's morale, substitutions, injuries, transfers, promotion and relegation, tax, interest, wages and many more than there are room to print here. At the virtually give-away price of just £9.99 Football Director will give you hours, if not days or weeks, of action-packed excitement.

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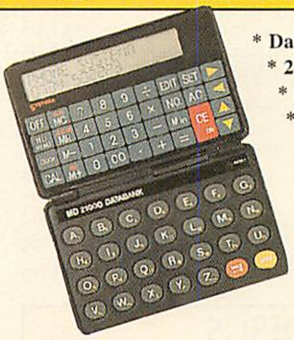
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And for just £49.95, saving £10 off the recommended price, you're sure to find it helps your bridge playing to improve — as well as being a fun pastime you can play anywhere.

*** 4 levels of play**
*** Plays 3 hands**
*** Random cards generated for each hand**
*** You bid against the computer**
*** You can be dummy, declarer or defender**
*** Checks for and disallows illegal play**
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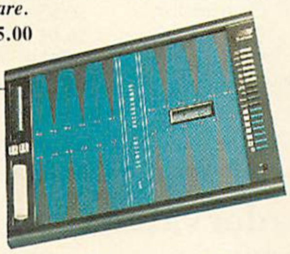
It comes with a comprehensive coaching facility which teaches tactical manoeuvres, warns you if a piece is in danger and even shows you its thinking.

Programmed with several difficulty levels, whether you are a beginner or a master, the Pocket Plus will give you a challenging game — every time. And it even remembers the state of play when you switch it off.

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WHAT'S THE POINT?



Bored with your furry friend? **RICHARD BROWNING, ROB MILLER** and **MALCOLM BROWN** get together to take a look at some alternative pointing devices

Despite its popularity, a mouse is not always the perfect pointing device for a micro. A graphics tablet can supplement or replace a mouse for the input of two-dimensional co-ordinates. It has several advantages over our furry friend. For example, it's far more accurate and can assist with the input of highly detailed drawings into CAD packages.

Watford Electronics recently introduced the first graphics tablet for the Arc costing a touch over £300, so I was eager to get my mitts on it. The first thing I noticed is that the tablet is not of Watford's own making – it's a PC tablet, by Genius, supplied with a Watford serial interface cable to attach to the Arc. Nevertheless it has a very high resolution – of the order of 1000 lines per inch – over its 12x12in 'drawing' area.

I set about unpacking the beast. Supplied with the tablet itself comes the interface cable, a 'puck' (the pointing device with cross-hairs set in a transparent window), software, an instruction manual for the PC and an installation pamphlet written by Watford. The pamphlet is not, unfortunately, of the best quality. It has been photocopied onto green paper and the most advanced typographical effect it offers is italics.

The tablet is powered by 5 volts, which can come from an appropriate transformer (not supplied), or the Arc. The latter

involves removing the Arc's cover and plugging and unplugging some wires to tap into the 5V supply. It also requires a serial port, so you may find it necessary to purchase an I/O podule to get another port.

The software is installed as a module, which intercepts all mouse calls. *TABLET brings the tablet into operation. By issuing a *MOUSE, the tablet is nullified and the rodent is back in use. There are only a small number of commands, the most interesting of which displays the positions of the DIP switches on the back of the tablet. These set the baud rate, word format and other communications parameters.

Once running, the software and tablet work fine. The software provides the option of changing the scale on the tablet – the entire screen can be traversed by the pointer after moving the puck only 6in or so. Using the graphics tablet is possible with any software that uses the mouse.

If you need a tablet for the Arc now then you haven't, at the moment, got any other choice but the Watford offering.

It does work well, although a bit more work on the installation guide and the software would be appreciated.



Anything that uses a mouse for control will work with a joystick

Joystick

Another alternative to a mouse for Archimedes users is a joystick. The Delta Cat joystick from Voltmace replaces the mouse and fits into the same socket on the back of the keyboard. Tastefully coloured in Arc brown/grey, the joystick fits-in with the rest of the hardware.

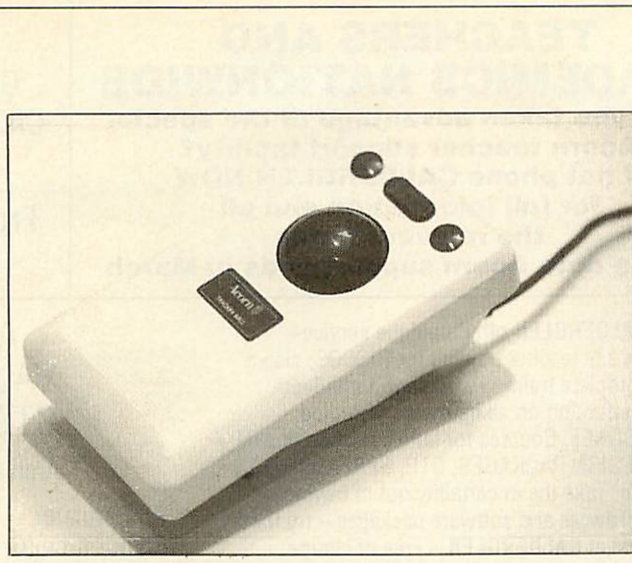
The joystick is based around an old Voltmace Beeb analogue stick and works in a similar way. It is spring-loaded and self-centres when not being held.

X and Y control is accomplished using the stick, which can be adjusted for sensitivity using the two potentiometers The three buttons emulate the mouse buttons, and perform the usual select, menu and adjust functions. In operation, the joystick is ideally suited for games. Anything that uses the mouse for control will work with the joystick and there are one or two programs specifically written with this in mind – *Interdictor* from Clares is a good example.

Accurate control for programs such as *!Draw* is possible but the stick must be used very lightly to position the cursor. Clicking on objects and dragging them can be cumbersome as two hands are needed.

If you don't mind unplugging and

Essentially, mice are strictly for mice. Real men use trackerballs



plugging every so often, I would stick to the standard mouse for Risc OS desktop use and maybe switch to the joystick for a heavy games playing session.

Trackerball

If your introduction to computing was by way of Missile Command in the local arcade then you won't be satisfied with anything but trackerball control. Mice are for mice. Real men use trackerballs!

Archimedes (and A3000) owners can get their hands on this sublime technology thanks to Pineapple Software's trackerball adaptor. A Marconi trackerball is used. These are really meant for the BBC model B and Master (and a variety of other manufacturers' machines) but they suit this purpose well.

The trackerball plugs into the adaptor's small box (it uses a Beeb user port connector) and the lead from this goes into the mouse socket on the Arc. There are three buttons on the trackerball body and these correspond to the three select, menu and adjust buttons on the normal mouse.

At first you may have a bit of a problem with the arrangement of the buttons and the ball. When you come to drag an icon or window on the desktop you have to hold the left-hand button down and accurately rotate the ball.

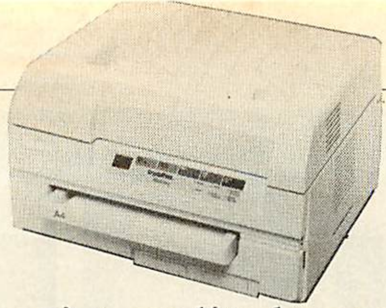
This seemed to be impossible with one hand. However, with a bit of perseverence combined with inhuman powers of co-ordination I soon got the hang of holding the button down with my index finger and manoeuvring the ball with the middle finger of the same hand.

Of course the trackerball is great for some games on the Arc and perfect for accurate relative positioning of the pointer in applications such as *!Draw*. However, after a while I found it just as good as a mouse for desktop work too. My mouse is now hibernating.

The Archimedes Graphics Tablet costs £302.45 from Watford Electronics, 250 Lower High Street, Watford WD1 2AN.

The Delta Cat joystick costs £29.95 from Voltmace, Unit 9, Bondor Business Centre, London Road, Baldock SG7 6NG.

The trackerball adaptor costs £22.95 from Pineapple Software, 39 Brownlea Gardens, Seven Kings, Ilford 1G3 9NL. The Marconi trackerball itself is also available from Pineapple for £45.



For those who want Postscript-quality laser printing, the CrystalPrint Publisher from Qume offers the affordable solution. **ALEX VAN SOMEREN** tries it out

CRYSTAL CLEAR

The Qume CrystalPrint Publisher is a 'Liquid Crystal shutter' printer rather than the more traditional laser printer. It is supplied with built-in Postscript interpreter clone software, 35 fonts and RS232 serial, Centronics parallel and Appletalk (Macintosh) interfaces.

The printer is one of the most compact I've seen, measuring just 16x14x10in. Unfortunately, this means the paper path through the printer is so tortuous it will only print on paper with a weight of less than 100gsm – high-quality company letterhead could be a problem.

Traditionally, Postscript interpreters have been expensive and slow but Postscript remains the *de facto* standard for page composition in the desktop publishing world. To get around both of these problems, Qume commissioned a printer controller board using a new chip set from Weitek which, broadly speaking, interprets the bulk of Postscript in hardware.

As you might expect the resulting page composition time is somewhat improved. The printer also costs a lot less than most, since no royalties are being paid to Adobe, the inventor of Postscript.

Setting the printer up is as simple as you could reasonably ask – plug in the power and data cables, feed it some paper and switch it on. Within a minute the printer is ready for action, a bank of coloured lights telling you if anything is amiss. The review of the similar (but not Postscript-compatible) CrystalPrint Series II in the February 1989 issue of *BAU* will give you the idea of this machine in use.

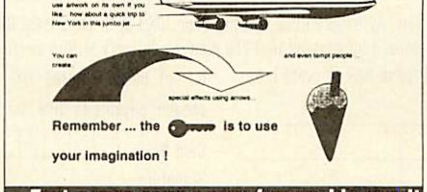
First I used Acorn's *Desktop Publisher* program to print several test pages and got very favourable results. Instead of the three or four minutes per page required for the Series II with LaserJet emulation, the Publisher took about 10 to 15 seconds to compose pages of text in a variety of sizes of the same font.

Dragging an *!Edit* file onto the PrinterPS icon printed the page so quickly that I couldn't distinguish the timing from that for a blank piece of paper to make its way through the printer – a zippy eight seconds. Several *!Draw* files took a quite acceptable 10 to 15 seconds each, the variation in time having to do with how much of the page was filled by the *!Draw* object (about an eighth of it and all of it, respectively).

Bit-mapped graphics, on the other hand, is where Postscript in general and the Publisher in particular fall down. It took seven minutes to compose one test page (a sprite scaled to fill the page using ADP) – twice as long as the Series II. However, it should be said that all Postscript printers respond slowly to this sort of test.

Finally, to try and determine the degree of Postscript compatibility more directly I entered some of the examples from Addison-Wesley's series of books about Postscript, controlling the printer directly. Admittedly I didn't have time to use the really big and complicated examples but all those I did try worked perfectly.

Happily, I didn't encounter any problems with the printer during the course of the review. However, several people have reported that the CrystalPrint Publisher will not work if connected directly to the Archimedes Centronics parallel port. I did not have this problem because I was printing over Econet and through my SJ Research MDFS fileserver, but it's obviously very important to most users.



Test pages gave a very favourable result

The usual solution is to connect the printer using RS423 serial cabling, which works fine though it is significantly slower than the parallel port. Qume is sorting out the problem with the Centronics port anyway. It should also be said that some versions of the *!PrinterPS* application shipped by Acorn will not drive this printer correctly. However, a new version fixing this problem has been released by Acorn.

Another potential drawback is that the CrystalPrint Publisher cannot accept new downloaded Postscript fonts in the Adobe format (this is to prevent Adobe from suing Qume!). On the Arc this is not so much of an issue, but if the printer were connected to a Macintosh it would seriously limit the range of fonts which could be used.

The Qume CrystalPrint Publisher is very fast and provides excellent Postscript compatibility, despite running a cloned interpreter and fonts from Bitstream.

The print quality is excellent, giving blacker blacks and purer greys than any other Postscript printer I've tried. On the down side, it has electronic compatibility problems with the Archimedes, doesn't support manual paper feeding or envelopes, won't take heavy papers and has no other emulations than Postscript (so it can't be used with *View*, for example).

However, the Publisher is competitively priced for a Postscript printer at £3449. An upgrade board for existing Qume CrystalPrint Series II printers is priced the same as the difference in the cost of the two printers.

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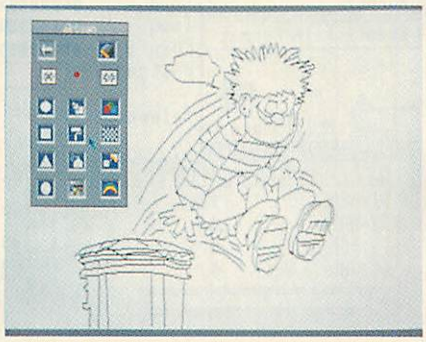
The first third party art package for the Archimedes has undergone a revision for Risc OS as ROB MILLER discovers

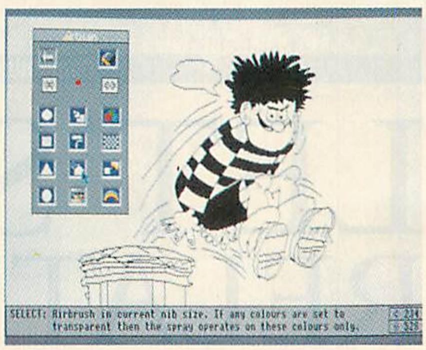
Clares produced the first art package for the Arc soon after its launch. Now in its second version, *Artisan 2* is effectively an upgraded *Artisan* with (most of) the bugs removed plus a number of enhancements and new features.

Advertised by the makers as 'Risc OS compatible', *Artisan 2* boots from the desktop and after requiring you to type in a short security colour code, it installs itself on the menu bar.

Unfortunately, that is where the 'making use of Risc OS' stops. It still uses the cumbersome menu system found in its predecessor and there has been no real effort to fit it into the Wimp standard. At least users of the original *Artisan* shouldn't have any problems getting started.

As mentioned before, *Artisan 2* is really an upgrade of the former, so I'll only mention what's been changed and what's new. Readers who wish for a more detailed overview should read the original *Artisan* review which appeared in the February 1988 issue of *Acorn User*.



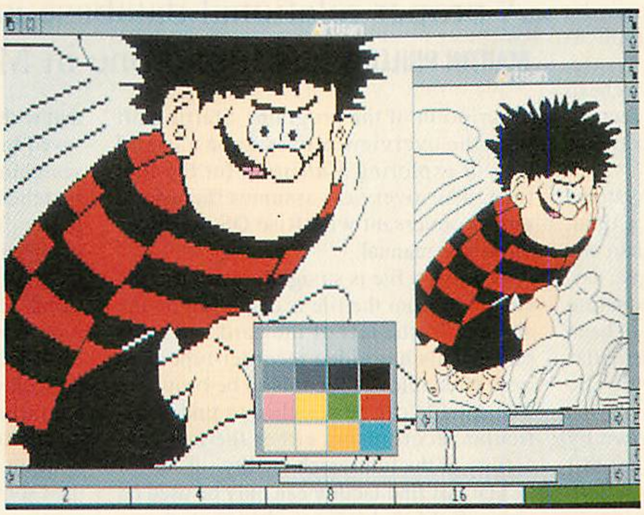


In the beginning

Starting at the draw menu, apart from the addition of a simple airbrush, the first real difference is the way in which the pixel editor works. One of my main criticisms of the original *Artisan* was the inability to see what you were editing when a change was being made. The editor now works in two scaleable windows, so it is possible to see 1:1 and magnified versions of the same scene simultaneously.

Unfortunately, the magnified window always sits on top of the 1:1 window. I can't see why Clares hasn't made them interchangeable. If it had stuck to the desktop, the problem would have been eliminated. The other change in the draw menu is an extended sub-menu to use with the fill option. Shading of scenes and objects is now simple, with the option of a graded fill. The extended fill defaults to eight shades of grey although this can be changed to any other group of colours in the current palette.

An extension to the magic brush which swaps colours on screen for pre-defined alternatives allows solid areas of colour on screen to be dithered with any other colour. If this option is used in conjunction with the grey scale fills, eight 'shades' of any colour can be achieved.



Colourful graphics are easy with Artisan 2

All tools in the outline menu can now be used in the pixel editor, making the positioning of triangles, circles and so on more accurate. Moving between shapes has become difficult though, as you now have to leave the pixel editor first, reselect and then go back. A simple gridlock has been added and can divide the screen into any of six partition sizes. However, there's no way of actually seeing the grid, so positioning lines is still tricky.

Sprite creation and manipulation have been greatly enhanced with the addition of a 'scissors' tool and the ability to have more than one transparent colour. Scissors allow any shape to be 'hand-cut'. Using one or more transparent colours even allows sprites with 'holes in' to be grabbed. Sprites and their masks can now be scaled according to the user's needs by stretching them with the mouse pointer.

Sprites have also been tied in with the fill option and can be used to fill areas and shapes. They can be repeated over an area or squashed into a regular shape.

Tools of the trade

The toolbox, home of all things miscellaneous, has had a spring-clean. Gone is the printer tool-screens are now printed via one of the four Risc OS printer drivers supplied on the Resource disc (included with *Artisan 2*).

A global magic brush (which really should have been an option of the original tool in the draw menu) allows whole rectangles to be changed in one go. Ideally it would have been nice to see all tools (draw and outline) usable with the magic brush.

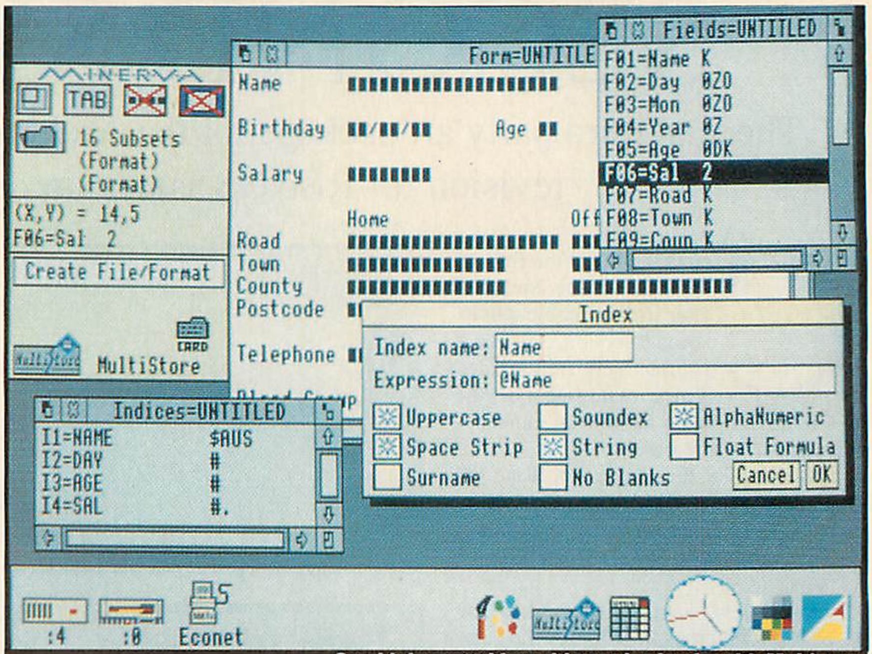
Finally, the font list has now been upped to 26 fonts. Using fixed-height, bit-mapped characters, the font tool allows text to be placed anywhere on screen in any of the 16 palette colours.

The verdict

Artisan 2 is certainly an improvement on the original program, although there are still a few areas which could be tightened up. Converting it to be completely Risc OS-compatible would be a good move. It would make it easier to use and a more powerful program as a result.

Let's hope an *Artisan 3* comes along soon. In the meantime, however, *Artisan 2* can be described as 'perfectly adequate'.

Artisan 2 *costs £60 from Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire CW9 7DA.*



Combining graphics with text is simple with Multistore

LET'S GET RELATIONAL

A proper relational database is a rare creature but **MARTIN PHILLIPS** has found one in Minerva's Multistore

Multistore is a new professional relational database management system for the Archimedes computer running under Risc OS. It can be used for creating simple information files to store record cards, such as details of club members, or it can just as easily be used for more complex business applications such as stock control.

At nearly £300, *Multistore* is not a cheap package but Minerva expects it to become the *de facto* database handling software for both the Archimedes and A3000.

Normal database management systems can only cope with one datafile at a time, but *Multistore* is able to link more than one file together. So, it is possible to have, say, one datafile of books read and a separate file of authors. Then if both files have been loaded, the information about a particular author can be displayed alongside the record about the book.

Many good programs are let down by flimsy packaging or handbooks that fall apart the first time they are opened. *Multistore* scores highly here by having a ring-bound A5 loose-leaf handbook with a pocket for the program and data discs.

Normally such handbooks do not sit on the shelf too well, but *Multistore* has a strong plastic covered box that this folder slides neatly into – just like some of the horrendously expensive software found on IBM PCs.

At the front of the handbook are four yellow pages containing a practical overview of *Multistore*. The other 180 pages of the handbook form a detailed description of the program. Starting off with the overview proves to be a useful way of exploring *Multistore* for the first time. This overview assumes the user is quite conversant with Risc OS – as does the whole manual.

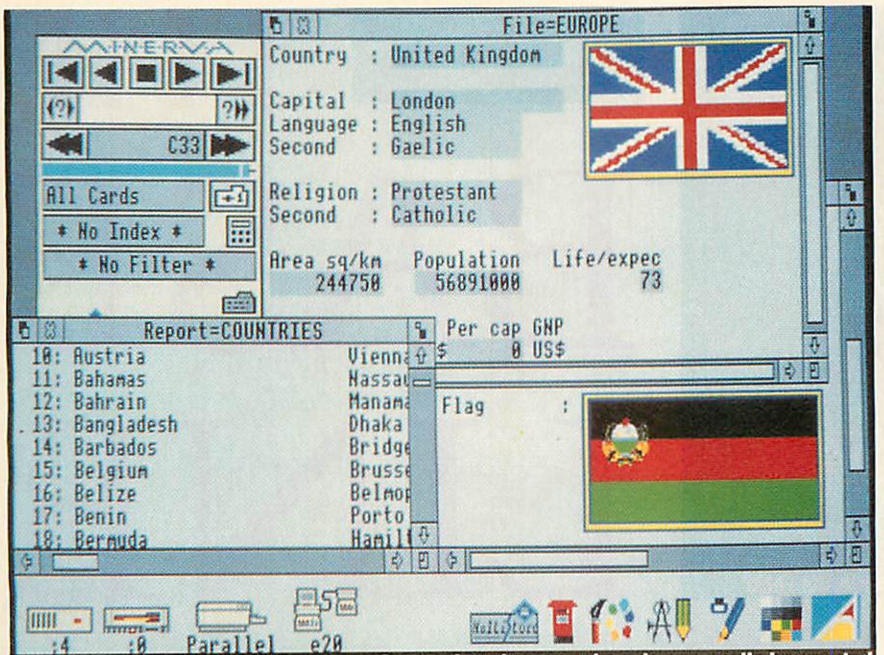
Loading a file is straightforward and the first card from the file is displayed on the screen. To the left of the card is a tools panel. This has video recorder-type controls to enable the records to be browsed. The datafile can be searched to find a particular record using either the fast find facility or the full search facility.

The fast find facility can only be used on those fields which are designated key fields when the datafile is created. The fast find facility would be useful for, say, finding a record card for a particular person when the name is known.

More complex searches can be made and, if required, the results of the search can then be saved as a subset of the main file. There are two similar options to do this: filters and searches. These enable a condition to be set up so only those records which meet that condition will be displayed. The difference between the two is that with a search, the subset created can be saved for use at a later date, whereas when searching with the filter, the whole file is searched each time. A filter or search dialogue box can be called up. This has an impressive range of facilities – too many to list. Suffice it to say the possible combinations of filters should far exceed the requirements of almost any application. Most impressive is the 'sounds like' facility, with which you can search for a similar sounding word. Once the technique is understood, setting up filters and searches is quite easy, and requires far less effort than some of the more established business relational databases.

Using the windows environment allows *Multistore* to offer an exciting range of features. It is possible to create pictures from within art packages and store them with individual records. It is possible to take information from datafiles and paste it into other applications.

As well as the card format it is possible to display files in a spreadsheet format. A macro facility enables frequently used sequences of commands to be stored and repeated at a later time simply with a press

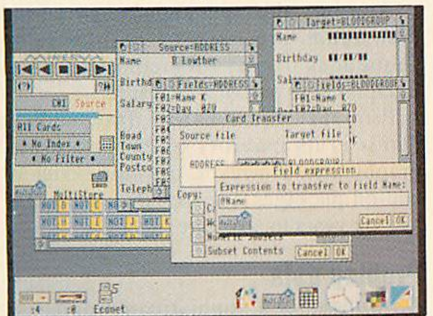


Comprehensive record cards can easily be created

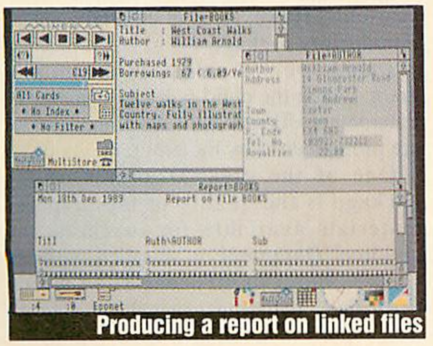
Multistore makes extensive use of Risc OS and has many exciting features – I very much enjoyed exploring it

of a key. Macros can include calculations to be made and placed anywhere on the record card. Data editing and entry are simple, and you do not have to go into a separate part of the program to undertake such editing.

Multistore has a full range of reports. It can simply print out cards or it can provide a comprehensive report option that includes full totalling and subtotalling. It is even possible to use linked files to contribute fields to a report. The report can be from a full file or from a subset of that file. Labels can also be printed out in various



Setting up a calculated field



Producing a report on linked files

formats. *Multistore* also allows cards, and fields in cards, to be exported to a range of popular wordprocessors.

In reality, using the program, creating a datafile, producing reports and many of the other facilities are easy and a pleasure to use. I wish I could say the same about the quality of the documentation.

For this price I would expect extensive tuition. Instead I found it quite hard going and not at all easy to follow.

For example, having inexpertly created two files, I went on to link them together. This is covered in two sections, a reference section near the end and as part of a tutorial section. Here are the instructions to link two files from the tutorial section:

'Drag the Card icon from the Teachers file Tools panel and drop it into the Link to box. Also from the Teachers file, drag the Form field and drop it into the Using the expression box. This will ensure that the link will be made on the contents of the form field in the Teachers file. Lastly, the field or fields in the Pupils file that will searched to match with the contents of the Form field in Teacher file have to be specified. In this case only the Form field in the Pupils file will match. Drag from the Pupils file the Form field and drop it in the by key box...'

On the same page there was a dump of the link dialogue box, which was of little use as it simply mirrored the box on the screen. It would have been far better to show a whole-screen dump and actually show where the information was dragged from and into which of the three slots in the link dialogue box it needed to go.

The windows environment does cause problems too, as at this point there are three windows on the screen and they need careful positioning in order for the various parts of each window to be accessed. Again a full-screen shot could have greatly helped here.

It was confusing trying to create my own link using my files while referring to the tutorial section. The reference section was of little help here too.

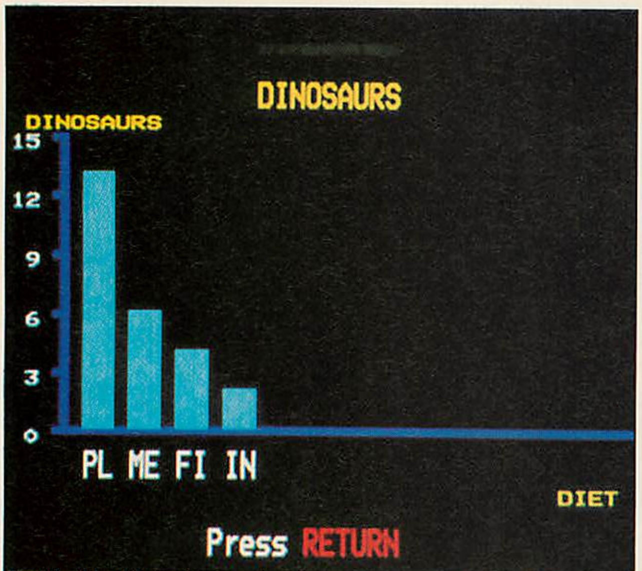
Much of the documentation is written in a similar heavy style. Incidentally, the tools panel, which the documentation claims is at the very heart of *Multistore*, is explained on page 80, some 20 pages after the above quote appears!

The layout of the documentation is not clear. I would have preferred a short demonstration section which did not assume quite such a full knowledge of Risc OS, followed by a comprehensive starter section to enable one to get into *Multistore* and use the basic facilities therein.

Many people, like myself, learn through developing their own applications rather than ploughing their way through worked examples. Many of the advanced features ought to have been covered in a separate full reference section. The actual reference section provided seems to rely on the user having read, understood and remembered the tutorial section.

I enjoyed exploring *Multistore* and could find many uses for it. It makes extensive use of Risc OS and has many exciting features. It is only a pity such a versatile, well-produced program is let down somewhat by the quality of the documentation.

Multistore *costs £299 from Minerva Software, 69 Sidwell Street, Exeter EX4 6PH. Tel: (0392) 437756.*



Factfile: ideal introductory database, forerunner to Our Facts



THE BASE LINE

Computer handling of data is an important part of school life. **DAVE FUTCHER** looks at the wealth of software currently available

Back in 1981, the Cockcroft report, *Mathematics Counts* found children spent a great deal of time collecting data but relatively little time in interpreting it. The 1989 National Curriculum has three whole Attainment Targets devoted to it.

There are many types of database packages: 'view' databases such as teletext, 'hierarchical' databases based on a tree structure and the most common type, like an electronic card index. These allow children to enter a series of conditions and view the records which satisfy them. It is this type we look at here.

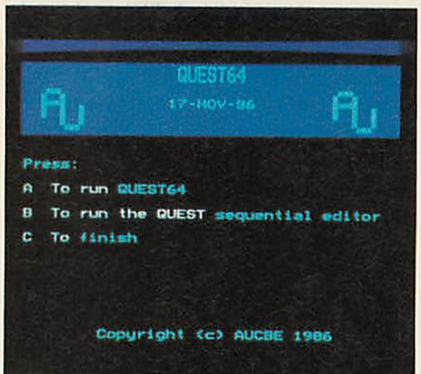
First facts

When educational computing first arrived in primary schools with the BBC micro, it was accompanied by a range of programs from the MEP. One was *Factfile*. This is an ideal introductory database and unlike some of the later packages, it uses one program that both creates and interrogates files. *Factfile* unfortunately restricts the size of all fields to just 12 characters.

1984 saw the official follow-up to *Factfile* – *Picfile*. This used datafiles created by *Factfile* to create pictorial representations of the information stored.

From the same author came the most popular data handling package for very young children – *Ourselves*. This was part of the *Infant Pack* released by the MEP's Primary Project in 1984. Some restrictions of the program were sorted out and by 1987 versions of the *Our Facts* program began to appear.

This was finally put on national release by the MESU in 1988 in its *Information Handling Pack* – a first rate first database.



Quest : a popular educational database

Listing data

Another outstanding database package is *Lists* – from Manchester Semerc in 1984. It's still available free of charge under the Blue File system.

Lists is actually a suite of three programs that guides the child through creation, saving and subsequent use of a list by offering clearly defined options at each stage.

Quest

The *Quest* family of data handling packages developed at the Advisory Unit in Hatfield is probably the best known of all the educational databases. *Quest* first appeared in 1983 and has been followed by a number of improved versions.

All of the *Quest* family use a powerful but complex command language, which is particularly effective when commands are strung together in sentence-like structures. The standard version of *Quest* allows the user over 12,000 characters of data, all of which are read into memory. A sideways Rom version allows about twice as much data to be used.

The most recent version of *Quest* is *Quest 64*. This will run on a Master 128 or a Master Compact using the 64K sideways Ram to hold data.

Among the package's extended commands are ones to enable frame sequences from a video disc to be interpreted as part of a record.

Probably the greatest drawback to *Quest* is its inability to display results graphically. However, a whole series of add-on packages has appeared during the last six years to take care of that.

Probing data

Dataprobe is a sophisticated database which, according to the publisher, Addison-Wesley, is aimed at nine to 13-year-olds. However, it is certainly not an introductory package.

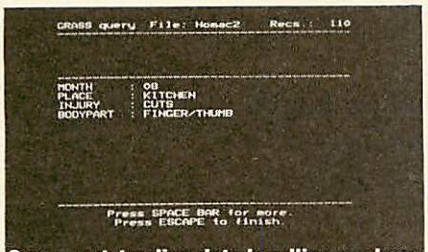
Dataprobe is a command-driven program, where the child types in commands. Parameters either follow the commands or are prompted for by the program.

One of the great strengths of the package is the quality of the prepared materials available for teachers and children. *Dataprobe* is supplied with the 'Town and Country datafile' which provides information about North Kensington in London and the village of

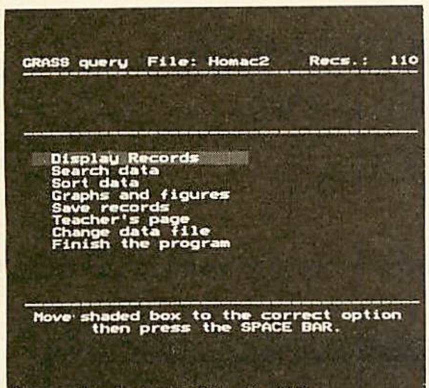
Wortham in Suffolk in 1861. This is a superb introduction to using census materials in class.

Graphics, searching and sorting

Newman College in Birmingham has developed some outstanding packages for the BBC and Nimbus micros. In 1985 the college released *Grass* (which stands for GRAphics, Searching and Sorting) a straightforward information handling package. *Grass* has all the usual searching



Grass: outstanding data handling package



Grass also has graphics facilities

and sorting facilities you would expect from any decent educational database and it also includes graphics, so the results of current searches can be displayed as graphs and diagrams without the need for further utilities.

The package is supplied with several sample datafiles, is simple to use and an ideal package to follow on from *Factfile*, *Picfile* or *Our Facts*.

Finding the data

Find has been produced as a result of co-operation between Humberside LEA, Resource and Earo – the Cambridgeshire LEA Publications Unit.

It's a disc-based package and the system makes use of both serial and direct access searching and direct access editing. Each field can be up to 255 characters long and up to 32 fields are allowed.

This is an ideal package when rapid data sorting and extraction is required. The syntax for creating searches is easier than that with most other software.

The *Find* package even includes a reporting program called WW+Rept for



Find: ideal for rapid data sorting

the *Wordwise Plus* wordprocessor.

A simpler but file-compatible version called *Junior Find* is also available and this proves ideal for eight to 10-year-olds.

Beginning data

One of the best introductory databases designed for the youngest children is *Notebook* from 4Mation. This forms part of the outstanding *Zoopack* package.

Notebook is no more than an information store. But that is its advantage as a real starter package. Information is easily entered and can be referred to later. Up to 40 pages or records can be stored in each file and each page contains a title and three to eight headings or fields.

Another beginner's package for data-handling is *First Filer* from Chalksoft. It is menu-driven which means the children don't have to remember an awkward command syntax. Usefully, the function keys have been pre-programmed to minimise typing too.

With *First Filer*, the skills of creating, editing and searching can be quickly learnt and with the three sample datafiles covering birds, food and mammals, it's an excellent starter for lower juniors.

Tracing data

1986 saw the appearance of another simple database package called *Tracer* from Woodsoft. It soon became popular because of its speed and simplicity. It has limitations in the length and number of fields, as the total field length is a mode 7 screen line. This was improved considerably, however, with *Tracer 80* which provides 80 columns per record.

Despite its limitations, children find *Tracer* easy to use for storing information connected with all sorts of activities.

Super storage

Superstore is a Rom-based database designed particularly for the educational market. It was first published by ESM in 1986 as a result of collaboration with the MEP. An add-on disc called *Superstore Plus* was released in 1988. This is a random access database with all the data kept on disc. It has considerable capacity. Each record can be up to seven screen pages long containing 500 words, 250 fields of up to 250 characters. Information from record searching is well presented and *Superstore* is particularly at home with large files on a hard disc.

The key to data

In 1987, Independent Television surprised everyone with the launch of *Key* – a low-cost but highly specified data management package that offered more and better facilities than many of the more expensive Beeb educational packages around.

Key has all the usual facilities for storing, searching, selecting and sorting information. In addition it has powerful graphing, mapping and statistical utilities built-in and accessible from within the package. Over the last three years *Key* has had a major impact on educational computing. It is truly supported by the ITV network with a full range of published datafiles linked to school's television programs and current affairs.

Conclusion

There is a wealth of database packages available. Our *Facts* is likely be an infant teacher's choice and offers a comprehensive coverage of facilities across the junior and early secondary years.

But it is *Key* which offers most. Its power, value and extraordinary range of linked datafiles make it the ideal all-purpose package for schools and colleges.

PicFile *costs £17.50 from Cambridge University Press, The Edinburgh Buildings, Shaftbury Road, Cambridge CB5 2RU.* Our Facts *is free of charge as part of the Information Handling Pack from MESU, Unit 6 Sir William Lyons Road, Science Park, University of Warwick, Coventry CV4 7EZ. Lists is available from LEA Computer Centres free of charge. Also available from the North West Semerc in Oldham for £5.* Quest *costs £21 from the Advisory Unit, Endymion Road, Hatfield, Herts AL10 8AU.* Dataprobe *costs £49 from Addison-Wesley, Finchampstead Road, Wokingham RG11 2NZ.* Grass *costs £28 for the BBC and £25 for the Arc from Newman College, Bartley Green, Birmingham B32 3NT.* Find *costs £26.50 from Resource, Exeter Road, Doncaster, DN2 4PY. Notebook is part of the Zoopack package from 4Mation Educational Resources, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ.* Tracer *from WoodSoft, 12 Copsewood Avenue, Nuneaton, Warks CV11 4TQ.*

First Filer *costs £19.25 from Chalksoft, PO Box 49, Spalding, Lincs PE11 1NZ.* Superstore Plus *costs £55 from ESM, Duke Street, Wisbech, Cambs PE13 2AE.* Key *costs £7 from ITCA Ltd, 6 Paul Street, London EC2A 4JH.*

SCREEN TEST

Two new high-resolution monitors for Acorn's 32-bit machines come under the steely-eyed scrutiny of **GRAHAM BELL**



Taxan's high resolution Viking R140: aimed at specialist users

The NEC Multisync is something of a standard in the monitor world – it was this monitor that created the whole market for multiple frequency monitors. NEC has recently replaced the original and Mark 2 Multisync models with a range of three multi-frequency colour monitors, the 3D, 4D and 5D.

The 3D reviewed here is the mainstream model, aimed squarely at the corporate IBM PC or Mac user, yet supposedly suitable for Arcs and A3000s too. How does it fare against the established favourite, the Taxan 770?

The main innovation in the 3D is its control of the picture size. Multisync monitors often have an array of knobs to control picture position and size. Adjusting them becomes second nature for Arc users.

In the PC world, most machines run in just the one 'best' video mode provided by the hardware, but Arc users switch between modes at whim, trading memory and speed for resolution and colour.

Each different screen mode (or each major variant: standard mode 12, multisync mode 20, VGA mode 27 and my personal favourite mode 82) has a unique size and shape on the screen, so the knobs need tweaking for each one. The Taxan 770 is ideal because it has four groups of knobs relating to the above four screen modes.

The NEC 3D improves on this. It has a memory and its own microprocessor – it's about as smart as a Sinclair ZX-81. That intelligence is used to recognise the video signal, compare it with some stored data on screen size and adjust the display to the best advantage. It works but it doesn't work well. VGA modes (25-28 on the Arc) are fine but it doesn't know about any other Arc modes.

Unrecognised modes can be manually adjusted using switches on the front panel. But there are two major problems. First, there isn't enough adjustment available. I couldn't even get a decent display in standard mode 12. Second, if you change the switches to a second unrecognised mode, it forgets the first! Unbelievable.

This monitor, with a vaunted ability to decode and recognise video signals and control the display format digitally, doesn't have any way to memorise new control settings. Just how difficult can this be?

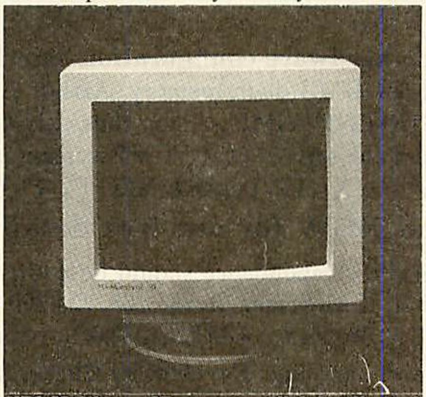
The 3D's better points include its stylish exterior that can only be described as Macintosh-like, the sharp screen quality and reasonable colours. But these count for nothing. Someday, perhaps all monitors will be made like this. But don't buy one for use with an Arc.

Viking R140

It's a surprise when a Japanese monitor manufacturer notices Acorn at all, let alone produces a monitor specially for Acorn's Unix machine, the R140. Nevertheless this is just what Taxan has done with the Viking R140, a very high resolution 19in mono display.

In truth, the custom job requires no more than a couple of BNC cables in a bag marked R140, and a pair of new connectors on the back of a monitor that's already popular in the Mac and PC world. But credit is due to Taxan for doing it at all.

The monitor is dedicated to mode 23, a very high resolution black and white only mode like a giant mode 0 (but 1024 by 896 pixels instead of 640 by 256). No other mode is possible. Why would you use such a beast? They are used in professional programming, CAD, DTP perhaps, but certainly not in a domestic setting.



NEC Multisync 3D: smart, stylish but limited

Setting the monitor on the Arc emphasises its size. It's huge and a real effort to lift even with two people. Connecting it up is fine, no adjustment was necessary with the review unit and you can run a normal monitor at the same time.

Two obey files and the desktop palette menu can be used to switch between them (you need to *Configure MonitorType then change mode). The huge screen made using *!Draw* or *Acorn Desktop Publisher* a dream and the Cinemascope scale of the display is an eye-opener.

It's rock steady too, without any hint of flicker, because of the high screen refresh rate of 66Hz. Glare is a problem though on such a large screen, particularly if you work with white text on a black background (outside the desktop).

One drawback is a bug in the VIDC chip inside the Arc that means when the pointer is on the extreme right of the big screen, it gets completely scrambled and is useless for pointing. Only a redesigned VIDC chip could prevent this. The second is that being a true mono monitor, there are no greys. The quality of fancy text on screen is noticeably less readable than a lower resolution monitor which allows greys to be used to anti-alias the characters. The higher resolution doesn't help the non-anti-aliassed (!) system font either – it's just smaller – and you can't see the effect of any grey tints you might add to the page. It's either white or black.

If you want a 19in high-resolution monitor for mode 23, the Viking is nearly the only game in town. There is competition, but only at a much higher price.

Conclusion

Would I swap my usual monitor for two large boxes of new improved electronics and glass? Yes and no. Some people with specialised needs would benefit from a Taxan Viking, but no Arc owner should be tempted to buy an NEC Multisync 3D.

CHEQUE IT OUT

Paying can be so much easier, reports DAVE FUTCHER

What makes *Wordwise Plus* so different is its programming language. Since its launch, companies like Norwich Computer Services, IFEL and others have produced many specialist applications.

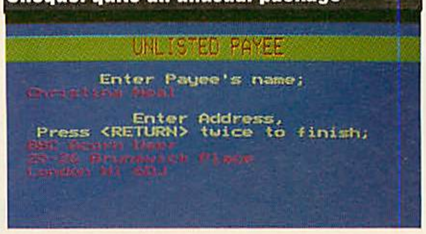
Now Carious Software has produced *Cheque* – a suite of *Wordwise Plus* segment programs for the generation, printing and analysis of cheques for a small business or club. No printed manual accompanies the package but on the disc are two files which give all the information you need to set up and use the program effectively.

There is some setting up required before the program can be used. After the transfer of certain files to a work disc and the compilation of a list of names and addresses in which each payee is given a unique flag for later analysis, using *Cheque* is easy.

The program is normally loaded into segment 0 of *Wordwise Plus* and SHIFT-f0 pressed to start the program but instructions are given for writing a four-line auto-booting routine to do this automatically.

Cheque does all the cheque printing and even fills in a label for the cheque stub too. The Elite 12cpi typeface is selected to increase the number of characters on a line as the default 10 pitch Courier is too large.

Cheque: quite an unusual package



The package will print on any standard bank cheque, torn out along the perforations. The package can also draw payee names and addresses from a prepared list on disc or the information can be input directly. When individual or banks of cheques have been produced, adhesive labels can be printed for the envelopes. On a BBC Master 128 the date is read from the computer's clock for the cheque. Most impressive is the conversion of numeric input of the amount into words.

As well as automatically dealing with your cheque writing, *Cheque* will produce a whole host of different lists including, of course, the serial numbers of cheques drawn, the payee name, the amount and the totals for the different flags the user has previously set.

This package has considerable power for organizing and recording your payments. It is not designed for the preparation of accounts but it does help in making lists for the returns. If you are a regular user of *Wordwise Plus*, *Cheque* could be very helpful in running your business.

SEE SOFTWARE SHOWCASE ON PAGE 134

GAME

Come on down! The price is right! Every second counts! Appropriate ways of starting the new look Games Pages, only I'm going to run out of 'game show' phrases pretty soon – I never watch them.

Anyhow, you deal with the shows and I'll deal with the games. Minerva, after a disappointing *Casino Games* and the much better *Caverns* – a sort of *Thrust* – should have by now finished a games disc containing a *Space Invaders* game called *Moondash* and another one with a 6in sucker-feet, wall-walking, bug exterminator who goes by the name of *Bog Hunter*. I wouldn't want to bump into him on a dark night, particularly if I was a bug called Bog.

Minerva is also having a bash at an adventure game. *Maddlingly Hall* is an Agatha Christie murder mystery, available in the near future.

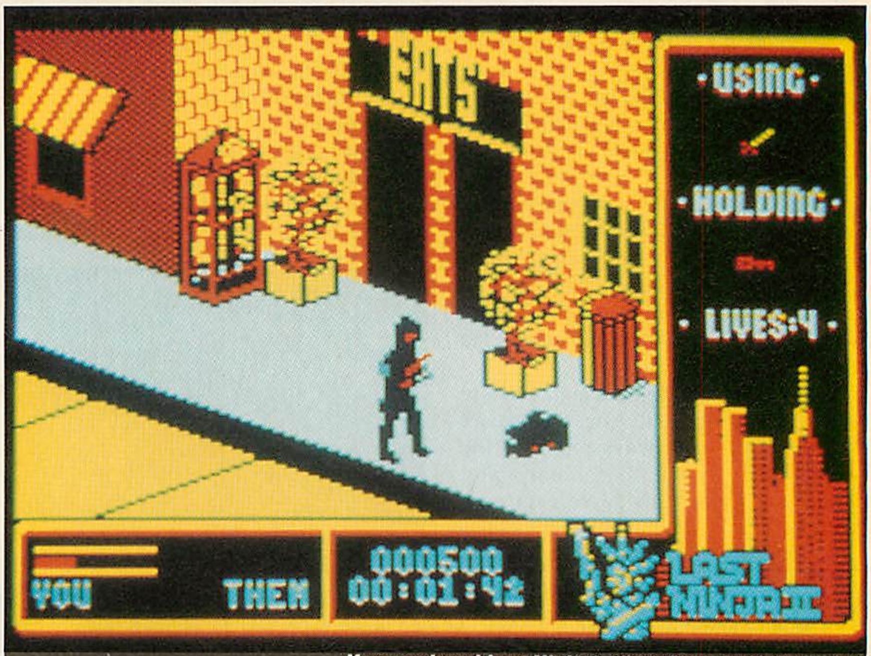
Following the success of the two *Beverly Hills Cop* films and with a lag of about five years, Tynesoft is all set to release a game of the same name. It will have its own plot but will draw ideas from each of the two films. Why now I don't really know. Perhaps the good Mr Murphy couldn't bear to leave out the Beeb and disappoint such a large sector of his fans.

Speaking of big screen to little screen conversions, top secret sources have claimed Superior is coding a version of *Robocop* for the Beeb. When asked to comment on this, important bods at the very heart of the Superior Foundation fought through the mass of cameras, microphones and me with cries of 'no comment' along with unkind words to describe the traitors.

I've been playing *Perplexity* from Superior and it's not bad. Its origins seem firmly based on the Arc's *Pacmania* although the objective is different. It's a variation of *Repton* on the puzzles front but isn't destined to become as popular.

I've also just completed Level 1 of *The Last Ninja II*, which is certainly a game worth considering if you enjoyed *Ninja I*.

TITLE	SCORE	PLAYER
Arkanoid	383,980	J Potter
Commando	537,400	A Knight
Conqueror (A)	3,728,214	W Stein
Danger UXB!	301,660	P Murray
Frenzy	765,494	P Bender
Galaforce	40,020	P Horsfield
Galaforce II	154,910	R Rodway
Impact	839,300	W Baird
Karate Combat	1,253,805	R Edwards
Labyrinth	531,520	P Graca
Orbital	3,955	M Price
Paperboy	190,800	R Rodway
Pole Position	112,950	M Young
Shark	179,650	N Davey Yie
Ar Kung Fu	864,300	P Graca



If you enjoyed Last Ninja 1, then the sequel is a must

Since June, the high score table has grown big and as promised in December, I'm not going to keep it all to myself. The scores shown are all new. The rest can be gleaned from the June 1989 issue of *BBC Acorn User*.

The *Labyrinth* and *Yie Ar Kung Fu* scores were sent in by Pablo Graca, who is the first contributor to have sent material all the way from Brazil! I didn't even know *BAU* was sold in South America.

Well, wherever you are, it would be nice to hear from you if you've got some news, views, hints, cheats or indeed a (proven) high score, although there won't be another table for a while.

Sam Greenhill



The UIM is capable of doing anything

UIM

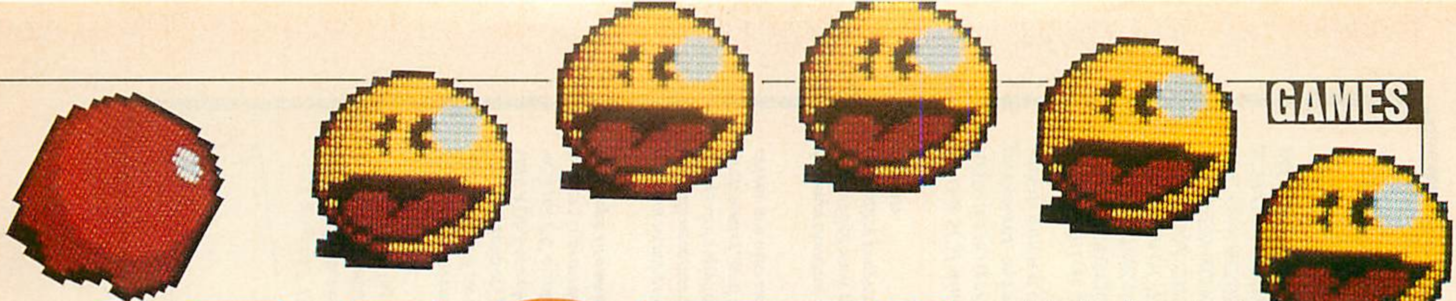
Fourth Dimension Tel: (0742) 700661
BBC/Master disc £19.95, Compact £21.95,

It has been said that *UIM* is a 'second *Elite*' and it's a title it stands up to well. With a undersea scenario that boasts 256 missions and 65536 ports, the familiar inter-port trading, a complex stock exchange and money markets, this is certainly a very substantial game. However, the price of all this is that it will not run in a model B without at least 16K of sideways Ram.

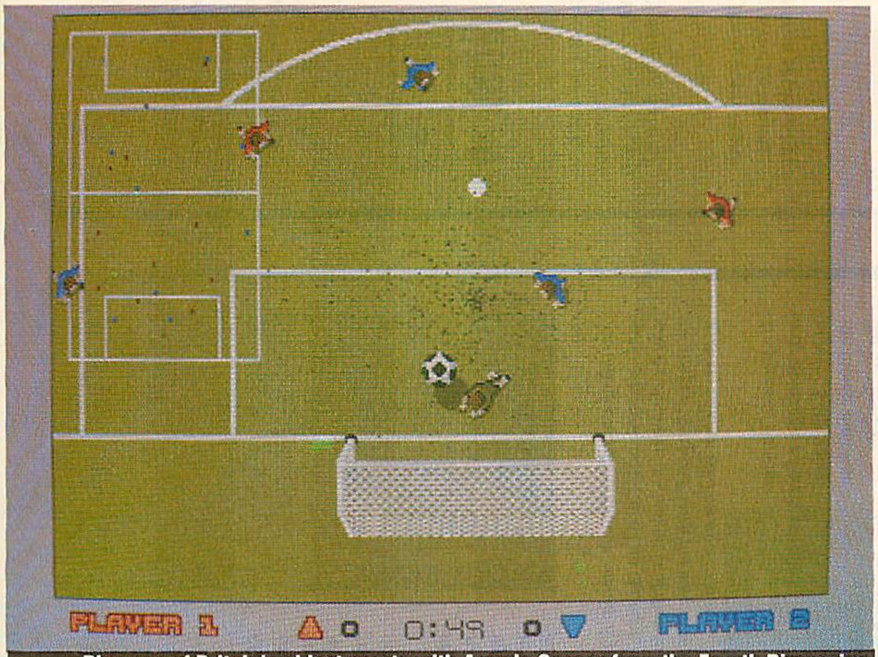
The game is set in the near future when the human race has been driven into the oceans by the heating up of the Earth. Basically, there were these 'replicators' which mutated to produce nasty groups of 'replicants' which were able to defend themselves, and these built up large hostile sub-sea cities. However, help is at hand to stop the replicants from spreading – the *UIM* – the Ultra Intelligent Machine.

This, if you hadn't guessed it, is where you come in – to go off in search of the thing. The graphics are good and there are a lot of different types of submarine to see. However, my only reservation is that the viewing area is too small. It restricts view while fighting and frequently means you can't see who is shooting at you.

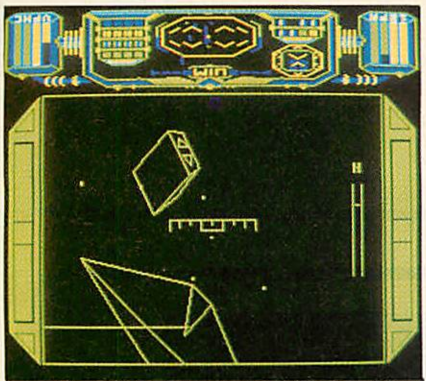
It also seems that the days of a 'safe



SHOW



Play one of Britain's oldest sports with Arcade Soccer from the Fourth Dimension



The UIM is capable of doing anything

zone' around ports has long gone – you get shot at as soon as you leave the port! To change ports you have to select a nearby one and launch into orbital flight. This seemed rather odd but it certainly scrapes the heat shield if you are slightly off course! Docking is achieved by heading for a buoy. Once docked, you can trade in items, equipment, currency and shares.

In all, *UIM* is an excellent game but I experienced problems on a BBC B – only eventually making it load by plugging a 32K Ram chip directly onto the board! Buy it straight away – it will keep you playing for hours.

Paul Thornton

Ricochet

Superior Software Tel: (0652) 58585
BBC tape £9.95, BBC disc £11.95, Compact £14.95, Electron tape £9.95

If you have a couple of hours to spare, why not test your grey matter on a game which will have you struggling for a couple of weeks, if not months.

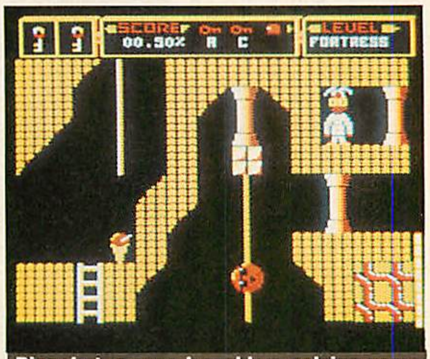
Ricochet puts you in the role of a Sprat, a red bouncing ball, whose main objective in life is to survive all the way to the end of the fifth level without dying. At this point you discover the secret message *#~#*. Sorry folks, can't figure that one out but perhaps future issues of *BAU* will enlighten us all with the answers!

Like most games, *Ricochet* isn't as easy as it looks, for not only must you dodge various unhealthy obstacles but the thought of dropping into a hole from which there is no return and having to commit suicide is not too encouraging!

There are five different levels and each one gets progressively harder than the previous one, and as you may expect, the meanies get meaner. But that should be no problem for our red bouncing hero.

The Sprat can jump at different heights and directions and roll up and down ladders and ropes. The action isn't fast and furious but it's a superb problem-solving game. A must for your games collection.

Mark Swaby



Ricochet: a superb problem-solving game

Arcade Soccer

Fourth Dimension Tel: (0742) 700661
Archimedes/A3000 £19.95

It sounds corny but 'they've done it again'. Yup, the boys in that other dimension have come up with the biz yet again.

Arcade Soccer uses an overhead view of roughly an eighth of the pitch at a time. The player sprites are small but acceptable and the sounds of the disgruntled victims of tackled men are sampled.

Up to 24 people can adopt international teams and play the World Cup together, but the computer can fill any gaps if you don't have enough chairs to go round! You always control the player nearest to the ball but sometimes there is mass confusion if six of them all leap on the ball at once.

There's a wide range of ways to play *Arcade Soccer*, and this allows you to 'clone' real arcade football games or those from other computers. It can be sunny, rainy or complete havoc. Thunderstorms lash the players and rain makes tackling a very slippery business. You can also adjust the swerve factor on the ball to an extent where kicking it sends it flying round in circles! You can even play football in the desert, at night, on a green pitch or in black and white! A real boon is the action-replay when you score a goal.

The referee whistles but keeps out of sight and there is no hope of fouling or being sent off. Offside has also been omitted. However, what do exist are good corner-kicks and throw-ins. The computer is a good player and uses its resources in an effective way, making a worthy opponent. The goal-keeper is always computer controlled but is usually quite sensible.

There is a radar scanner showing the positions of players but the one you're controlling is not distinguished from the others, so it is near impossible to use, putting you at a disadvantage to the Arc team.

Overall, I have no real complaint. *Arcade Soccer* is a worthwhile addition to any collection – coins, stamps or games!

Sam Greenhill

RETURN OF THE MASTER

The long-awaited new Master 128 system Rom from Acorn has finally arrived and DAVID ATHERTON has eagerly given it a run for its money



During the entire life of the Master 128, it has only ever had one operating system – unlike the BBC model B which had three major releases during its lifetime. Because all the filing systems and applications supplied with the machine are contained on the same Rom as the OS, these too have remained not updated until now, although all parts of the system have actually been the product of continuous development since their launch. Some of the improvements were seen in the OS Rom fitted to the Master Compact, released nine months after the Master 128.

Acorn has released a new system Rom for the Master 128. This is available as a separate replacement product for £44.85. It is not being fitted to new Masters in case there are any compatibility problems, although I found none while performing this review and it is most likely to be just games which cause such problems.

There are no new applications in this Rom but every program within it (except *Terminal*) has been altered and improved in some way. The only improvement to Basic is a speed increase in trigonometric and logarithmic routines.

An interesting point is that the Rom has a 1988 copyright message, although the manual is dated October 1989 and the beta testing of this Rom was closed off about a year ago. It is a dealer upgrade, but the procedure is no more complicated than fitting an application Rom.

ADFS

The most worthwhile improvement in the new Rom is the recoding of ADFS. First of all, it is significantly faster, particularly when reading in new directories. For example, a command such as *DIR a*.b* seems to work about twice as fast. The speed improvement when actually reading a file is not as great but still worthwhile.

Also, at long last, the essential BACKUP, FORMAT and VERIFY are provided in Rom so you no longer need your Master Welcome disc to perform these tasks.

For running programs written under DFS, the *DRIVE command is present and performs the same effect as *DIR :<drive>.$.

On the previous Rom, the *COMPACT command required mandatory hex parameters which referred to memory addresses. Now this is no longer necessary. COMPACT requires no parameters, and uses system workspace as a buffer. BACKUP, COMPACT and COPY do not now corrupt user memory and will even attempt to select mode 135 to avoid overwriting. They do however expect that you will not be using shadow memory for anything other than screen display.

If you almost always use ADFS, you will find life more pleasant using this upgrade. The changes to DFS are less startling but the major bug which didn't update files which were extended then closed with *CLOSE has been fixed and a speed increase has been achieved, particularly when using OSGBPB.

The *CLOSE bug was cured by many people by inserting an intermediate DFS (usually version 2.29) in the spare Rom socket. Fitting the new Rom returns this socket for other Roms.

Operating system

An improvement to the operating system is the keyboard handling which allows characters in the range 128-255 to be issued directly from the keyboard.

At a technical level, the system works by treating Ascii 0 (CTRL-@) as a special case. If you press CTRL-@, it is stored and the next character typed has 128 added to its value. So, if you wanted to generate the Greek character gamma (upper case) which has an Ascii value of 195, you would type CTRL-@ followed by C (C is Ascii 67 and 67+128=195). All other parts of the Mos which are affected are suitably altered, for example *BUILD and *APPEND now allow characters 128-255 to be entered when building up files.

If you almost always use ADFS, you will find life more pleasant using this upgrade

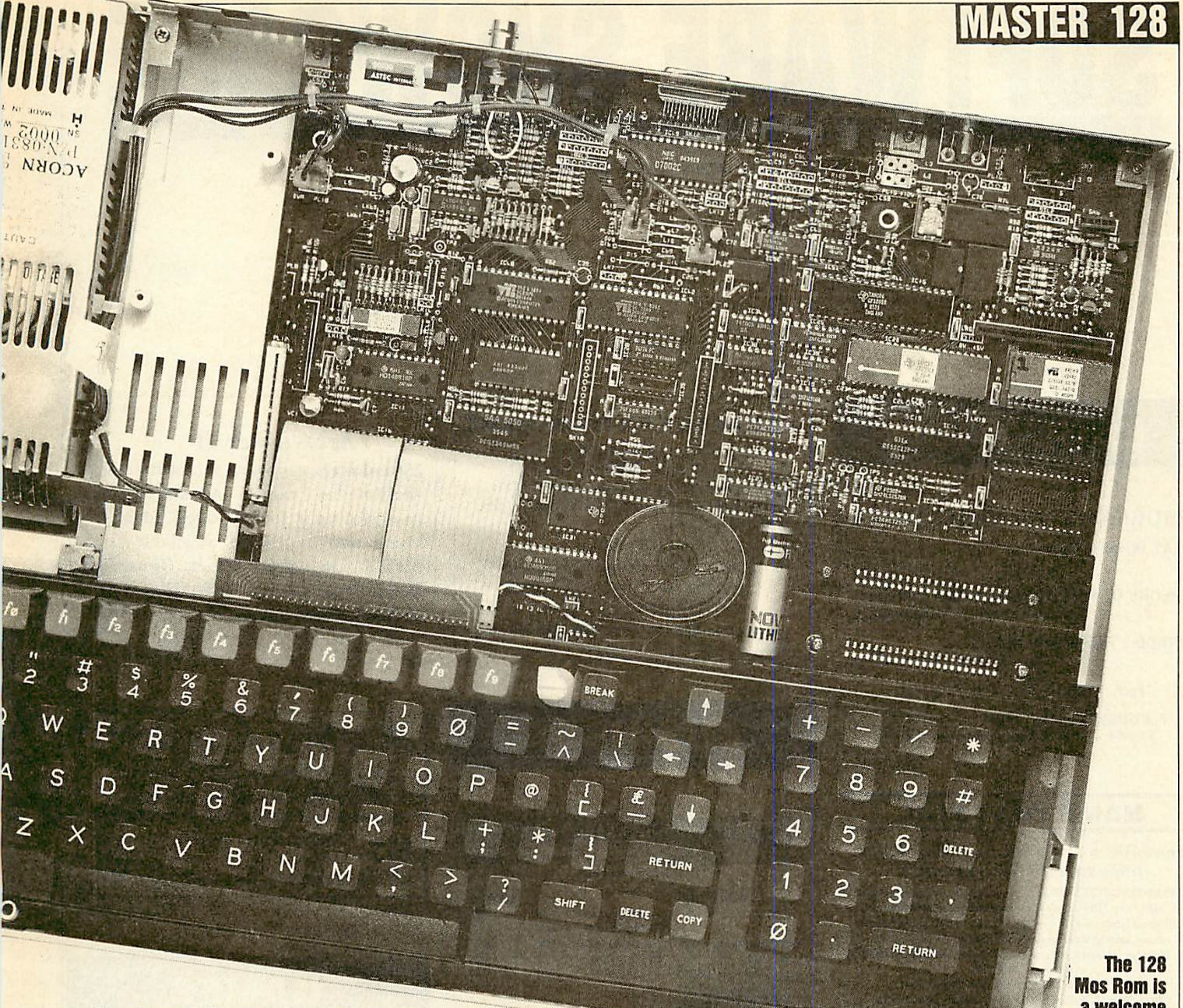
A number of minor changes have been made. *REMOVE now fails if two filenames are used (to avoid accidents when *RE. is used for *RENAME). *UNPLUG unplugs identical copies of a Rom. *SHOW without a parameter shows all 16 key definitions. The default CMos Ram settings (as set by R-Power On) are also altered. The sideways Ram filing commands are moved from the DFS to the main Mos, so they work when DFS is unplugged.

A new feature added to the sideways Rom handling part of the Mos allows a special format of language Rom, known as a relocatable Rom, to be written. This type of Rom will automatically relocate to high memory on a 6502 second processor, and *Edit*, Basic and *View* are now written this way. This feature does not apply to other existing Roms unless the Rom is written to take advantage of it.

View and Viewsheet

A fair amount of work has been done on *View* but *Viewsheet* is virtually unchanged. The Rom now contains an inbuilt Epson FX series printer driver (which correctly allows you to switch line feeds on/off with FX6), loaded when you type *WORD.

The extended character mode applies to *View*, of course, so foreign characters can now easily be incorporated into *View* documents. However, a special printer driver would need to be created using the *View* printer driver generator.



The 128 Mos Rom is a welcome upgrade, but is it too late?

Some bugs in *View 3.0* are fixed, including the infamous one that prevents multiple files being printed where the date and time variables are present in the document, and obscure ones connected with line counting under microspacing, and using ^C (Ascii 3) in a REPLACE field.

Like the Compact Mos, the sideways Ram protection has now been removed from *View* but it has not been removed from *Viewsheet*.

Also like the Compact, a new *CONFIGURE command is provided which permanently sets the FJI flags.

There are no actual changes to *Viewsheet per se* but as a result of the extended character mode, the justify label command (SHIFT-f8) is now absent and if you have used this on any spreadsheet files already created, the cells will now contain extra top-bit-set characters. Because of the internal addressing method of *Viewsheet*, it has not been possible to create a second processor high version.

Edit

Edit, the much-under-rated text editor, has been improved in many respects. It now works with either carriage returns, line feeds or both, as line terminators. CTRL-f8 switches between the two.

This is especially useful when dealing with PC or Archimedes text files. Like the other applications, it also relocates high with the 6502 second processor. The find and replace now lets you continue automatically to the end of the file. The print option allows an unformatted text printout. Several other small niggles have been thoughtfully resolved.

Conclusion

At this point, I expect you want to know whether I would buy it or not. It certainly does seem expensive, and there is no single feature which makes it stand out. The plus points are clearly the speed of ADFS and the improvements in *View*, and for someone such as myself, who primarily uses the machine for wordprocessing with ADFS discs, it is clearly a good buy.

If however, you are a general computer enthusiast, doing a bit of wordprocessing, and a bit of programming, but also running a wide range of commercial software, then the possible compatibility problems are probably not worth it.

What is most sad is that if this Rom had been released two years ago a lot of problems could have been avoided, and everyone would have upgraded.

Most of the software which will ever be released on the Master has already been released, so this upgrade comes rather late for many of the benefits to be exploited - I doubt, for example, that many companies will upgrade their Rom applications to work with the relocator.

In schools, it is probably best not to mix groups of machines with old and new Roms, so unless you plan to upgrade all your machines, you shouldn't upgrade any. However, it would be a good idea for all software houses to buy a copy of this Rom, to minimise compatibility problems for whatever future software they may have in the pipeline.

The Master 128 Mos Rom costs £44.85 from any Acorn dealer.

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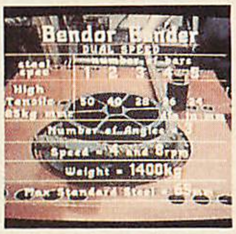
ACORN USER ADVERTISEMENT PAGES – MARCH 1990



VIDEO STAR

The BBC model B adds star quality to the world of promotional videos, as CHRISTINA NEAL discovers





Five years ago Kevin Cook decided to quit his ironmonger's job, to carve a career out of an already promising hobby – making videos. A friend, Tiffany Levi, was also gaining little satisfaction from her job, and so the pair formed a video production company in their home town of Loughton, in Essex. TK Videograph was born.

Kevin had already produced wedding and other domestic videos for friends, but despite his experience, resources were somewhat limited. With a large garden shed as 'work premises', their equipment consisted only of a Sony FI Beta recorder, a GXM 7 basic video camera and by complete contrast, a BBC model B.

They made the most of their facilities. The shed was converted into a surprisingly spacious and comfortable video suite, now hired out to other companies. The range of video equipment grew rapidly and the BBC micro was made full use of for three separate tasks.

'Originally, we used it as a wordprocessor, a database and also as a caption generator for putting titles on videos,' recalls Kevin. 'We certainly got our money's worth in those days.'

TK Videograph's early trade comprised of yet more domestic videos. However, as they progressed, Kevin and Tiffany began to fulfill their ultimate ambition – catering for large industrial firms. Nowadays, most of their business stems from industry. Large enterprises such as chemical giants Distillers MGs and the shipping company, Neptune Orient, have all relied on their skills to produce quality videos to promote a company image or a new product.

The success of TK Videograph has allowed Kevin and Tiffany to invest in a separate computer system for their office requirements. This enables the model B to play a full-time role in video titling.

The machine works well with their now complex range of video equipment, which includes time-base correctors to keep signals accurate, sound mixers and three editing machines. Kevin explains where the Beeb fits in: 'We have a genlock system which is hardwired into the BBC. This has a video input and output and the material from the micro goes into the genlock and onto the recorder.

'The machine runs with *Lynx* software which is at least six years old but it's quite flexible. It does caption advertising and you can still buy additional fonts for it.'

Naturally, Kevin has a wide knowledge of his video equipment but he admits he's no expert with computers and says he's impressed at the ease of use of the BBC micro. He also feels it's an ideal machine for newcomers. 'When we hire the suite out to clients, it doesn't take them long to get to grips with the software because it is user friendly and you can work it simply by going through the menus.

'You can edit pages really easily too, and that enables you to go back and change certain parts of the picture.'

Poised in front of a vast mixing desk facing an expansive video screen, Kevin is keen to demonstrate the many perks of using a BBC micro.

He begins to set up a video he has produced for a local firm advertising its services. The screen depicts the company employees working hard in a large industrial plant: a series of clear titles from the Beeb accompanies nearly every shot.

'I can record whatever comes on the computer screen,' explains Kevin. 'You can have colour bars coming from a camera in the studio, then two more signals coming off a tape. And I can either fill the screen totally with titles, or superimpose it over the normal picture. There's also a key which allows me to put titles over the top from the background colour.

'We can store about 500 different pages of text on a single disc, so it can do the closing titles too.'

Overall, business is looking good. But Kevin and Tiffany are keen to widen their horizons even further. Kevin recently teamed up with a rival firm in Dartford, Kent, to produce a simulation video aimed at the consumer market.

Kevin gives a brief demonstration of the video, which depicts a moving view through the picturesque countryside of Cumbria. Aimed at owners of exercise cycles, it enables viewers to simulate a relaxed cycle through the scenery and sunshine. It's bound to be a far more inspiring choice than gazing at blank walls while pedalling furiously! Exercise fanatics will be pleased to know that the video will be out early next year.

Meanwhile, Kevin aims to produce other simulation videos while maintaining a good level of service to industry. He admits that keeping up with the latest range of video equipment is an impossible task. Is he ever tempted by the speed and sophistication of a newer computer?

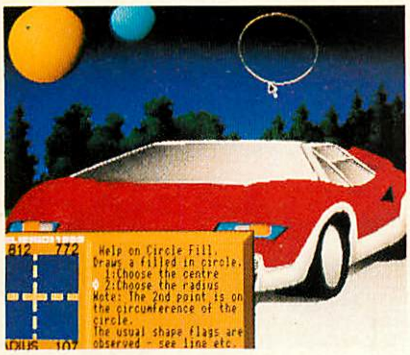
'Not at all,' he says firmly. 'Our Beeb is upgraded and with the disc drive, it's fine for speed. Other machines are OK for producing graphs but my main aim in video production is to get the titling right.

'Hopefully, that's just what we've been doing, because in this business you're only as good as your last production.'

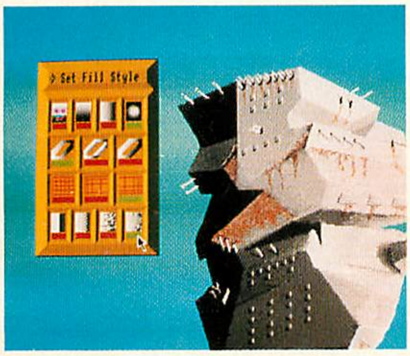
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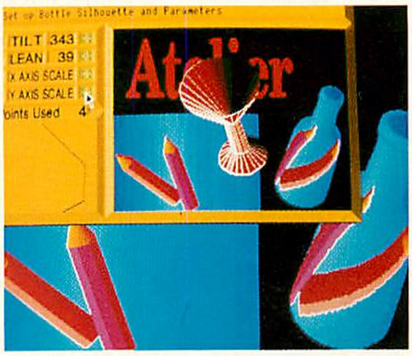
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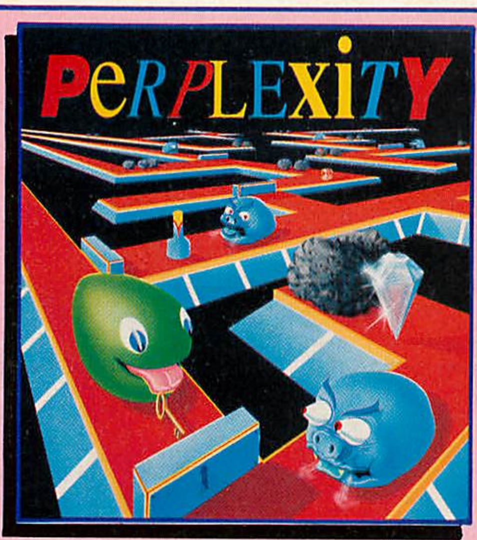
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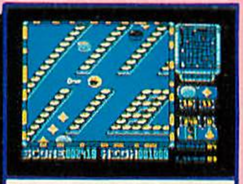
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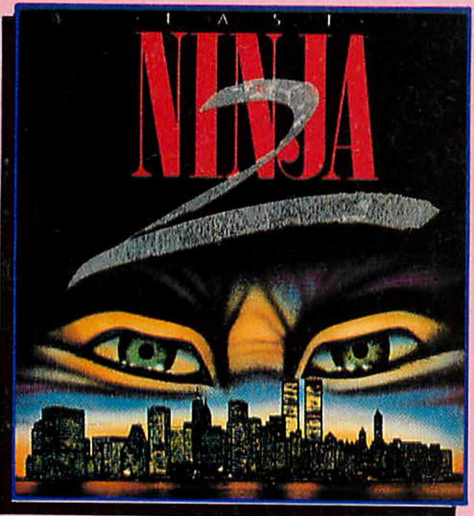
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